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The Automobile

Vol. XXXV
No. 25

NEW YORK, DECEMBER 21, 1916

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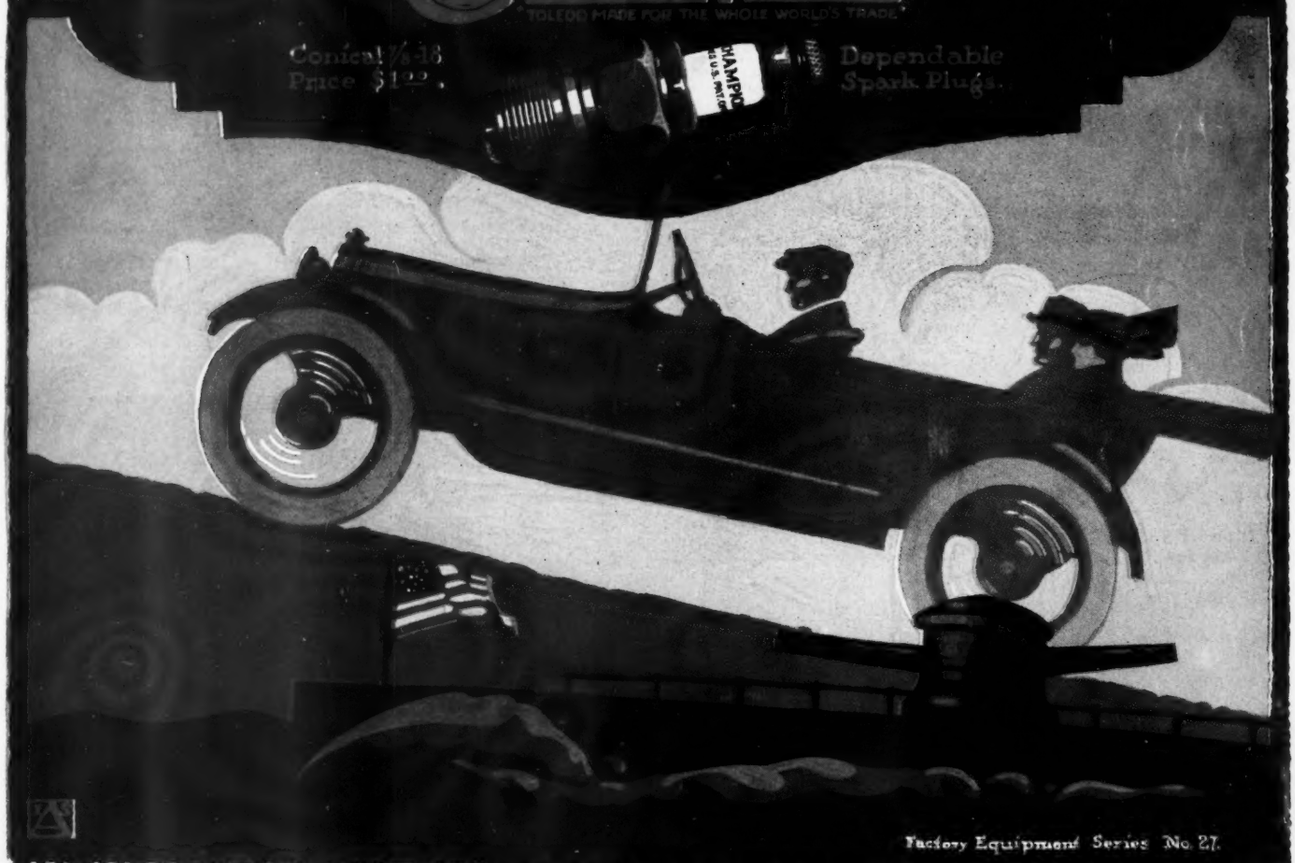

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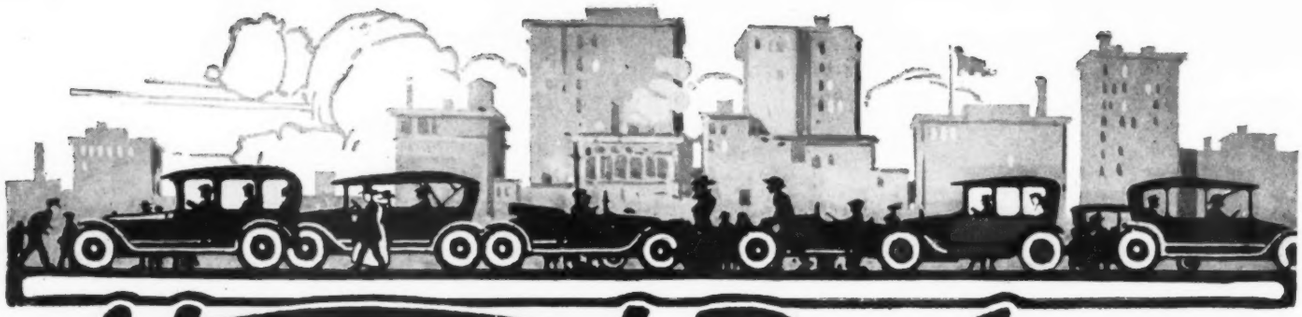

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Stewart Speedometer

$3.50

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Stewart V-Ray Spark Plug

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Stewart Vacuum System

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The AUTOMOBILE

VOL. XXXV NEW YORK—THURSDAY, DECEMBER 21, 1916—CHICAGO NO. 25

"Automotive" Saves Industry

Aviation Industry Threatened by Patents Looks to Automobile Example for Salvation

NEW YORK, Dec. 20—The budding industry of aeroplane manufacture has been threatened by a claim from the holders of the Wright patent for the double-acting aileron, much as the automobile industry was threatened years ago by the Selden patent. The Wright patent is not upheld any more strongly than the Selden patent was at first, but it seems that the situation may serve to weld the aviation industry, just as the Selden patent helped to weld automobilism. The patent refers to warping the ends of the wings for stabilizing purposes.

The Wright patent has 6 years to run, and the holders, the Martin-Wright Co., is asking all users of the patent to pay 5 per cent of the *gross* price of their product as royalty. With firms that have taken government contracts this represents all the difference between profit and loss. The near $30,000,000 which the United States Government is going to spend on aeroplanes is enough to establish a free industry that may be of inestimable value to the nation in years to come. The imposition of so great a tax upon this sum at the outset may easily be the equivalent of throttling an infant industry of vast national importance before it has drawn its first full breath of life.

Following the Wright patent announcement the Curtiss company, which owns uncontested master patents covering the hydro-aeroplane, has stated that if one tax is placed upon the industry it will also claim its rights. It is understood that the attitude of Curtiss has been taken partly with a desire to bring matters to a head so that some rational settlement can be reached. The Curtiss patents are of very recent date and, like the Wright double-acting aileron patent, are susceptible to much litigation.

Referred to Government

The matter has been referred by the industry to the Aero Club of America, which has turned it over to the Council of National Defense, since it affects the nation much more than any individuals. The United States Government has decided that the safety of the country is wrapped up with the efficiency of the air services of the army and navy to the extent that it is going to spend huge sums to establish the young industry. The club considers that anything that will restrict the growth of aeroplane manufacture at the present time is inimical to the safety of the nation. For this reason it is putting the matter before a body than can call upon the National Automobile Chamber of Commerce and use its organization for dealing with patent questions; that can deal directly with the contestants as representative of the government, and that is above any possible suspicion of personal favor. The Selden patent took years to settle; the Aero Club hopes that the N. A. C. C. and the Council of National Defense may be able to settle the present problem in as many days as the Selden patent took years.

The automobile industry was not in its early days regarded of national importance. It had no $30,000,000 grant from the government, no huge organizations to look to for support in difficulties. The aviation industry, already helped into existence by the automobile, is going to lean upon its parent in this, the first great problem of its young life.

No doubt what will happen is that the patent holders and those who want to use the patents will get together and settle the question. They will have the experience of the N. A. C. C. to call upon, the prestige of the government to dignify the consultation. Thus an early and satisfactory settlement is to be expected.

Highway Tractor Co. Incorporated

Organization of $2,000,000 Concern Completed—McCutchen Is President

INDIANAPOLIS, Dec. 19—The Highway Tractor Co., capitalized at $2,000,000 and headed by Carl G. Fisher, James A. Allison and Henry F. Campbell, of this city, was incorporated here last week to manufacture tractors with 10-ton drawing power for highway and military use. Work is to be started immediately on a site of 25 acres near the Indianapolis Motor Speedway on the first unit of a plant to cost $200,000. The company expects to have the plant in operation by May 1, employing 300 men, and working on material that has been purchased for the manufacture of 5000 tractors next year.

McCutchen Heads Co.

Charles G. McCutchen, who recently resigned the presidency of the Ross Automobile Co., of Detroit, will be president of the Highway company, and Mr. Fisher will be secretary-treasurer. Plans call for the construction of a concrete and steel plant 200 by 400 ft. The tractor will feature many of the inventions of B. R. Parrott of Jackson, Mich. A. E. Schaaf of Poughkeepsie, N. Y., recently with the Fiat Automobile Co., and formerly manager of the Pope-Toledo Automobile Co. of Toledo, Ohio, will be factory manager. Other stockholders in the company are Louis Goodhart of St. Louis, Dr. M. N. Stewart and Forrest C. Badgley, both of Jackson, Mich.

The company announces it probably will build a tractor with a 5-ton drawing power in the near future, and later may enter the farm tractor field. The price of the 10-ton drawing power machine will be approximately $1,250.

400 at Manufacturers' Banquet

Speeches by Prominent Men in Automobile Industry Enthusiastically Received

DETROIT, Dec. 15—The Manufacturers' Banquet, given by the Society of Automobile Engineers, last night witnessed the attendance of more than 400 guests and members, and a most enthusiastic spirit blended with serious discussion and wholesome and enjoyable entertainment.

Brilliant, substantial and amusing speeches, an orchestra, several singers, and a moving picture combined with the dinner served to make the evening one of solid pleasure. Among the speakers were Coker F. Clarkson, general manager of the S. A. E.; Job Hedges, of New York, Captain L. E. Goodier, Jr., of the aviation service; H. M. Leland, president of the Cadillac Motor Car Co., Russell Huff, president of the Society of Automobile Engineers, and Howard Coffin, director of the Hudson Motor Co. K. W. Zimmerschied, engineer for the General Motors Co., acted as toastmaster.

Growth of the S. A. E.

D. McCall White, chairman of the Detroit section, introduced Mr. Zimmerschied, who made an entertaining speech and introduced Mr. Huff, who discussed the future outlook for automobile engineers. Mr. Clarkson told of the growth of the Society and of the probable amalgamation of other societies working in similar fields with the Society of Automobile Engineers. Mr. Leland commenced his address with a number of humorous stories and later developed the serious and important subject of industrial unrest and its possible consequences. Mr. Hedges in a speech filled with amusing critical shafts aimed at different guests and members present, brought rounds of laughter, and completed his discussion with a thoughtful talk on the need of patriotism, the deplorable lack of sentiment that exists in the country to-day and its importance above more material things. Captain Goodier and Howard Coffin discussed at length the subject of aviation and the general need for industrial preparedness. Captain Goodier told of the vast increase in appropriations for army aviation and of the gap it caused in the number of men and machines required, and wound up his address with an appeal to the engineers and manufacturers to join in the aviation reserve with their mental and physical strength and manufacturing resources. Mr. Coffin told of the aviation work he had witnessed at General Pershing's camp. He stated that aviators made many daily trips over mountains, requiring 2 days' travel in an automobile, and carried the mail from the camp to its destination in less than 70 min. He told of a route proposed over the Lincoln Highway which will be dotted with landing places within the next 8 months and will be known as the Lincoln Aereo Highway, and predicted that the use of aircraft of all sorts will be a common matter in the very near future.

In the course of his discussion, Mr. Coffin pointed out the vast quantity of aircraft now in use in the war and compared it with the few machines in the army of this country, showing how slow our manufacturers of aircraft and other war supplies are in the making of them, and urged the makers of automobiles to throw their resources into the work in accordance with the plea of Captain Goodier.

The evening wound up with the display of the moving picture The Eagles Wings, which dwelt on industrial preparedness, and was discussied, while shown, by Mr. Coffin.

Among others who attended were W. C. Anderson of the Anderson Electric Co., Hugh Chalmers of the Chalmers Motor Car Co., R. D. Chapin, of the Hudson Motor Car Co., George Dunham, John F. Dodge, of Dodge Brothers, Garvin Denby, of the Denby Motor Truck Co., H. W. Ford, of the Saxon Motor Car Corp., Professor Walter T. Fishleigh of the University of Michigan, Alfred Giauque of the Puegeot Co., of Paris, Christian Girl, president of the Perfection Spring Co., H. M. Jewett, president of the Paige-Detroit Motor Car Co., Paul E. Kelecom, of the Peugeot Co., of Paris, F. E. Moscovitz of Nordyke & Marmon, Percy Owen, of the Liberty Motor Car Co., W. C. Rands of the Motor Products Co., and Artemus Ward, Jr., of the King Motor Car Co.

—

Meyer Resigns from Maxwell Directorate

NEW YORK, Dec. 19—Eugene Meyer, Jr., has resigned from the directorate and executive committee of the Maxwell Motor Co., Detroit. A meeting of the directors will be held soon to elect a successor. Mr. Meyer, who is the head of the Stock Exchange house of Eugene Meyer, Jr., & Co., has been associated with the Maxwell company since its organization.

—

Heater Heads Bucyrus Rubber

BUCYRUS, OHIO, Dec. 14—Philip Heater was elected president of the Bucyrus Rubber Co., this city, to succeed R. O. Perrott, who resigned 6 months ago. The balance of the officers were re-elected at the annual meeting, as follows: Vice-president, George Donnenwirth; secretary, C. P. Mador; and treasurer, W. A. Blicke.

$1,000,000 Additions for Buick

To Produce 750 Cars a Day—Gross Sales for 4 Months Total $57,516,876

DETROIT, Dec. 16—The Buick Motor Co., Flint, Mich., will be enlarged by an expenditure of $1,000,000 to enable it to produce 750 cars per day. The company is producing 550 cars per day at present.

Gross sales of the General Motors Corp. for the four months ending Nov. 30 were $57,516,876.12 and net earnings for that period were $9,195,733.64 applicable to the common stock. November business was the greatest in the history of the company.

—

$1,010,000 Back Royalty for Perlman

NEW YORK, Dec. 18—The Perlman Rim Corp. has received a check for $1,010,000, covering back royalties from the Standard Welding Co., Cleveland, as determined by the special master appointed by the court. This brings to an end the famous legal battle between L. H. Perlman, inventor of the demountable rim, and the Standard Welding Co., the decision in favor of Mr. Perlman having been handed down in August, 1915, in the district court and confirmed by the circuit court of appeals in February, 1916. The Standard Welding Co. is now a unit of the Standard Parts Co., having merged with the Perfection Spring Co. The Standard Parts Co. name appears on the check.

—

Ford Loses First Court Tilt

DETROIT, Dec. 19—Henry Ford and the Ford Motor Co. were losers in their effort, yesterday, to obtain a reopening of the preliminary decision rendered in the injunction suit brought by the Dodge brothers to stop the plans for erection of a huge smelter plant at River Rouge for the transforming of crude ore into finished castings for Ford cars by a single heating process.

Attorneys for Ford stated that the injunction against the smelter would cost the company $6,000,000 a year, and Henry Ford offered to indemnify and pay the plaintiffs any damages that might later be awarded them as stockholders in the Ford Motor Co., by reason of the construction of the blast furnace, foundry, etc., if such works would be held illegal or unlawful, and further promised to pay all costs individually, that might accrue to the company if the later decision is against the erection of the smelter. The court refused to heed either promise and the injunction remains until the final hearing.

Standard Parts Co. to Expand

Perfection Spring Co. Sale Ratified and New Co. Will Double Factory and Force

CLEVELAND, Dec. 20—The Standard Parts Co., merger of the Perfection Spring Co. and the Standard Welding Co., will double its factory facilities and also the force of employees during the next 8 months. The company now occupies 800,000 sq. ft. and employs 4500 workers.

The sale of the Perfection Spring Co. to the Standard Parts Co. has been ratified by 95 per cent of the stockholders and the remaining 4 per cent are expected to follow suit. The board of directors announced in THE AUTOMOBILE last week will be augmented to fifteen when complete, the new members being presidents of automobile companies now negotiating to join the Standard Parts Co.

Of the $5,000,000 preferred stock issued, $4,000,000 was taken up in this city in 24 hr., the remaining $1,000,000 being held to exchange for old Perfection stock.

Net earnings of the Standard Parts Co. for the past 3 months are $450,000, or at the rate of $18 yearly per share of common stock.

There will be three departments. The spring department will continue the manufacture of Perfection springs, business in which is now running close to $3,500,000 yearly, nine contracts having been closed in the last 3 months for over $1,000,000; the rim and tube department will make demountable rims under the Perlman patents only and all types of unpatented rims and also truck bands. Business in this department is running at $600,000 a month, with future contracts on the books for over $5,000,000 worth of rims and $3,500,000 in tubes. The heater department business is increasing very rapidly, the company selling 2000 in December, 1916, as compared with 100 in December of last year. Several car makers with 100,000-car outputs yearly are negotiating for the heaters as standard equipment.

Under the new merger total net assets of the company must be 200 per cent of the preferred issue and the net quick assets must be 100 per cent thereof. No new preferred stock can be issued unless net earnings for the previous 2 years are three times the preferred dividend required for each of these years.

—

Taylor Is S K F Vice-President

HARTFORD, CONN., Dec. 19—S. B. Taylor, sales manager of the S K F Ball Bearing Co. of this city, has been appointed vice-president of the company, succeeding F. B. Kirkbride, who remains on the board. Mr. Taylor will remain in charge of sales.

G. A. Ungar, former representative of the company in Cleveland, Detroit and Pittsburgh, has been appointed technical manager and chief engineer, succeeding Uno Forsberg, who returns to Sweden after completing his work of creating the manufacturing organization of the S K F Ball Bearing Co. in this country.

—

Reo Stockholders Re-elect Officers

DETROIT, Dec. 19—Stockholders of the Reo Motor Car Co., of Lansing, Mich., met to-day and re-elected the officers and board of directors.

—

Covert Retires from Gear Co.

DETROIT, Dec. 19—B. W. Covert, president of the Covert Gear Co., Buffalo, N. Y., will retire from the company on Jan. 1, having disposed of his common stock. Control will pass to P. A. Clum of Rochester, N. Y., and F. E. Mosher of Buffalo.

—

Metz Announces 1-Tonner at $695

WALTHAM, MASS., Dec. 15—In order to meet the demand for lower-cost transportation by business men, the Metz Co. announces a high-duty 1-ton truck to sell for $695. The chassis frame is of 5 in. heavy channel steel, capable of more than its rated capacity load. The wheelbase has been lengthened to 130 in.

The final drive is by internal gear, direct on each wheel. The front wheels carry 32 by 3½ pneumatic tires, while the rears are equipped with 34 by 3½ solid rubber tires. It is built to speed up to 20 m.p.h. and weighs complete 2500 lbs.

The ½-ton Metz delivery car that stores throughout the country have found so valuable, will still be continued. This is a ½-ton truck, and sells for $500 to $600.

—

King Increases Prices Again

DETROIT, Dec. 19—The King Motor Car Co. has again increased its prices above those stated Nov. 15, when the last increase was made. The seven-passenger and four-passenger touring cars and the three-passenger roadster have been increased from $1,400 to $1,585, a raise of $185. The seven-passenger sedan has been increased to $2,150.

—

Stanley Steamer Prices Advanced

NEWTON, MASS., Dec. 18—The Stanley Motor Carriage Co. advanced its prices on Dec. 4, the five-passenger touring car going up from $1,975 to $2,200, the seven-passenger touring car from $2,075 to $2,300 and the three-passenger roadster from $1,950 to $2,200.

Eight Car Makers Increase Prices

Buick, Maxwell, Franklin, Standard, Paige and Auburn Included in List

DETROIT, Dec. 14—The Buick Motor Co., this city, will increase the prices of all its models on Jan. 15. Prices will be as follows: D-4-34, from $650 to $660; D-4-35, from $665 to $675; D-6-44, from $985 to $1,040; D-6-45, from $1,020 to $1,070; D-6-46, from $1,425 to $1,440; and D-6-47 from $1,800 to $1,835.

—

Maxwell Raises Car Prices

DETROIT, Dec. 19—The Maxwell Motor Co. has increased the prices of its touring and roadster models to take effect Jan. 1. The new price of the touring car is $635 as against $595 which was the old price. The new price of the roadster is $620 as against $580.

—

Franklin Price $100 Higher

SYRACUSE, N. Y., Dec. 18—The Franklin Automobile Co., this city, will advance its prices on all models $100 on March 1, 1917.

—

Standard Eight Prices $100 Higher

PITTSBURGH, PA., Dec. 18—The Standard Steel Car Co., this city, has raised the price of the Standard Eight $100, on its open models, effective Jan. 1. Seven-passenger touring car now sells at $1,900 and the four-passenger roadster at $1,850.

—

Paige Raises Open Car Prices

DETROIT, Dec. 19—The Paige-Detroit Motor Car Co. has advanced the prices on all its models. The new prices are Model 51 Stratford, seven-passenger touring, $1,495. Model 51 Brooklands, convertible roadster, $1,695. Model 39, Linwood, five-passenger touring, $1,175. Model 39, Dartmore roadster, $1,175. Prices of all closed cars remain unchanged.

—

Auburn Six Is $60 Higher

AUBURN, IND., Dec. 18—The Auburn Automobile Co. has increased its five-passenger light six $60, to take effect Jan. 1, 1917.

—

Allen to Drop $795 Car

FOSTORIA, OHIO, Dec. 20—The Allen Motor Co. will discontinue the manufacture of its $795 touring car and roadster after Jan. 10, 1917, and, in open models, will confine the 1917 production to the special finished Allen Classic touring cars and roadsters listing at $850.

Enlarge Standards Committee

Inclusion of New Branches of Automotive Engineering Means Great Expansion

DETROIT, Dec. 14—To provide for the broader activities of the standards committee work of the Society of Automobile Engineers it was voted to-day by the council of the society to reorganize the standards committee and enlarge it, so as to practically have a separate department for such work as aviation, agricultural tractors, marine engineering, and automobile engineering. With this object in view a committee of nine was appointed. The contemplated plan is to so organize the committee that much of the load of work will be taken off the shoulders of the chairman. An organization on similar lines to that of a government is possible, in which the chairman will be assisted by a cabinet or executive council of perhaps five or six. Each representative on the council will represent a department of the committee's activities such as aviation, tractor work, or marine or automobile engineering. Each member of the executive committee will in this way share the responsibility of the work with the chairman and be perhaps directly responsible for the standards work in the particular department he represents.

The committee reorganization consists of Coker Clarkson, general manager of the S. A. E.; A. L. Clayden, present chairman of the standards committee; John G. Utz, Perfection Spring Co.; K. W. Zimmerschied, metallurgist of the General Motors Co., and chairman of the standards committee in 1915; George H. Dunham, nominee for president of S. A. E. for 1917; Henry Souther, first chairman of the standards committee and now with the federal government in charge of aviation work; A. L. Horning, Waukesha Motors Co., as a representative of the agricultural tractor interest; Chas. E. Manly of the Curtiss company, representing aviation interests, and R. C. Coombs of the Prest-O-Lite Co., who has had a wide experience in marine engineering. The committee is expected to report at the January meeting of the society.

Additional Divisions?

In connection with standards committee work for next year it is generally understood that Mr. Utz will accept the position of chairman of the standards committee to succeed Mr. Clayden, engineering editor of THE AUTOMOBILE, who has held the position for the present year. Mr. Utz has for years handled divisions of the committee and is particularly well qualified to take up the work. His duties in this respect will be ably assisted.

The question of creating additional divisions of the standards committee was considered, particularly such divisions as relate to marine engineering and lubricating oils. The matter was referred to the special reorganizing committee. Other work to be assigned to the standards committee included: Test of wire wheel rims, thickness of pneumatic tire rims, and pneumatic tires for motor trucks.

It was decided that the consideration of aviation matters during the week of the New York aviation show should be handled by the Metropolitan section, in which connection it is probable that an afternoon will be given to the consideration of aviation standardization work and that a dinner in the evening will be followed by a meeting at which papers on aviation will be presented.

In addition to general routine work of the society, the council admitted sixty-six applicants into the various grades of society membership.

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Hilborn Co. Takes Over Answer Plug Distribution

NEW YORK, Dec. 20—The Hilborn Co., Inc., has been formed here to handle the entire output of the Hill Insulating & Mfg. Co., which produces the Answer spark plug. The Hilborn company will handle a number of accounts of which the Answer plug is the first. The Hilborn company will control the entire distribution of the Answer plug, the Hill Insulating & Mfg. Co. hereafter confining its efforts exclusively to manufacturing. The Answer plug is mica insulated and the makers have placed themselves in a unique position by guaranteeing its operation for a definite mileage. The plug is guaranteed to operate perfectly for a minimum of 10,000 miles, and if it does not it will be replaced. Headquarters of the Hilborn company are at 535 Canal Street.

—

McLeod Concentrates on Fabricord Co.

ST. LOUIS, Dec. 18—N. W. McLeod, president of the Fabricord Tire Co., has severed his connection with the German Savings Bank of this city, of which he was president, to devote his entire time to the tire company.

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Boydston Dauch Sales Manager

SANDUSKY, OHIO, Dec. 15—L. H. Boydston has become sales manager of the Dauch Mfg. Co., this city, maker of tractors. He was formerly sales manager for the company in Los Angeles. This company is now putting out a new tractor, known as the 10-20 model.

Indiana S. A. E. Talks Carburetion

Prof. Berry Emphasizes Correct Proportions—F. C. Mock Discusses Methods

INDIANAPOLIS, IND., Dec. 15—Two papers on carburetion were read and discussed to-night before the Indianapolis Section of the Society of Automobile Engineers. One was by Professor Berry of Purdue University and the other by F. C. Mock, chief engineer of the Stromberg Motor Devices Co. The conclusion reached by Professor Berry was that the correctness of the proportions of air and fuel in the gas is very important. Mr. Mock gave his attention mainly to the means for obtaining the perfect mixture called for by Professor Berry and described at considerable length some experiments made with glass carbureters and manifolds. He analyzed the widely varying conditions which a carbureter has to meet, showing how difficult a thing it is to design an automatic carbureter.

The discussion, which was thorough, had as its main topics the influence of the size of manifold and of heating the charge. In this prominent speakers were J. W. Esterline of the Esterline Co.; V. R. Heftler, Zenith Carbureter Co.; Frederick Purdy, of Findeisen & Kropf Mfg. Co., and A. P. Brush of the Brush Engineering Assn.

Discuss Difficulties

The speakers confined themselves mainly to a discussion of the difficulties of the problem, and it is hardly possible to say that any very definite conclusions were reached as a result of the meeting. There is no question, however, but that is was very valuable since a number of different viewpoints on the same subjects were explained so fully.

The major portion of Professor Berry's paper describing his experiments follows:

The carbureter performance is so often interpreted in terms of engine performance that it seems to me we ought to have a better standard of performance than this. To arrive at such a standard, we ran a series of tests at the university, undertaking to show the change in effect of gasoline and air mixture on performance. We tried to find what mixture gave the most economy and what mixture the most power, and the results of this I wish to report this evening. Before I do that, however, I want to enumerate the three requirements that it appears to me a carbureter should meet in order to give perfect performance, the three requirements our imaginary perfect carbureter would meet, as well as many other detail ones.

In the first place, it should be a good mixing valve; that is, the gasoline should be very thoroughly atomized. That is absolutely necessary. Future work may find another way of getting the mixture without this, but at the present time a good atomizing carbureter is superior.

Second, we want to get the proper amount of heat into the mixture. The first requirement, then, is to get gasoline and air thoroughly mixed in such a way that the mixture will get to the cylinder in exactly the same proportion as it left the carbureter. The carbureter must not cut down the volumetric efficiency. One case where it would do this is where it does not get to the throttle at atmospheric pressure. Then the mixture must not be heated. If it is heated at all, it cuts down the volumetric efficiency. The perfect carbureter will not do that. Third, the carbureter must furnish the engine with exactly that mixture which will give best performance at each speed and each load throughout the entire motor range.

The Best Mixture

The next question is, what is this mixture, and how does it vary? Do we need a rich mixture for idling, and a lean one for speed? Many experts seem to think both are needed, and there is another class that says neither is correct; that they want the same mixture for all speeds and at all loads. Which one is right? Does the mixture which gives the best power give the best efficiency? If not, how much difference is there between the mixture which gives best power and that which gives best efficiency? It is in an attempt to answer these questions that we have run these tests.

We had a six-cylinder engine, with the intake manifold inside. This helped to maintain a dry manifold and gave a satisfactory performance under circumstances which were adverse. The engine would idle, and hit every cylinder with very poor mixture.

We ran this test at 400, 700, 1000, 1300

(*Continued on page* 1043)

Corcoran Mfg. Co. Expands

Buys Properties of Two Cincinnati Concerns and Will Build Body Plant

CINCINNATI, OHIO, Dec. 14—The Corcoran Mfg. Co., maker of automobile bodies, fenders, hoods and radiators, has bought the properties of the Jacob Freund Roofing Co. and the Cincinnati Tile and Terra Cotta Co.

The company is planning the construction of a fireproof building of four-stories, 472 by 76 ft., to be used for the exclusive manufacture of automobile bodies. This will give employment to 500 men and will cost approximately $125,000.

When the company was formed, about 6 months ago, the result of the sale of the present officers' interests in the Corcoran and Victor corporations, it leased the manufacturing property at Winton Place. This lease does not expire for 3 years, at which time the company will erect a duplicate of the building now to be built, which will make the total plant area approximately 275,000 sq. ft.

—

Doehler Adopts 10 Per Cent Wage Dividend for Employees

BROOKLYN, N. Y., Dec. 16—Beginning Jan. 1, 1917, the Doehler Die-Casting Co. will declare a wage dividend at the rate of 10 per cent yearly to employees who have been with the company a year whenever the regular quarterly dividend on the stock is declared. The wage dividend, when declared, will be paid in full to employees with the company for over 3 years; two-thirds will be paid to those with the company from 2 to 3 years; and one-third for employees of 1 to 2 years' service.

Also beginning Jan. 1 employees who have been working on a basis of 50 hr. per week will be put on a 48-hr. basis at the same pay. The company employs 1200 men with a weekly pay roll of $25,000.

These announcements were made at a complimentary dinner last night tendered to the Doehler Executive Club, composed of all executive heads of the company, which has factories at Brooklyn, Newark, N. J., and Toledo.

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Johns-Manville Gives Employees 10 Per Cent Bonus

NEW YORK, Dec. 20—Employees of the H. W. Johns-Manville Co. with the company a year or more received Christmas greetings signed by President T. F. Manville announcing the board of directors' decision to give a bonus equal to 10 per cent of the year's salary.

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Princess Motor Corp. Now

DETROIT, Dec. 19—The Princess Motor Corp. of Delaware has been admitted to do business in the State of Michigan and has taken over the Princess Motor Co., which has heretofore handled the Michigan sales. Officers of the corporation are: O. C. White, president and managing director; I. N. White, vice-president and treasurer; H. C. Dawson, assistant sales and advertising manager.

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Comet Buys Plant Site

DECATUR, ILL., Dec. 18—The Comet Automobile Co. recently incorporated for $1,000,000 has purchased 20 acres of land upon which it plans to erect a factory and build a six-cylinder car to sell at $1,000.

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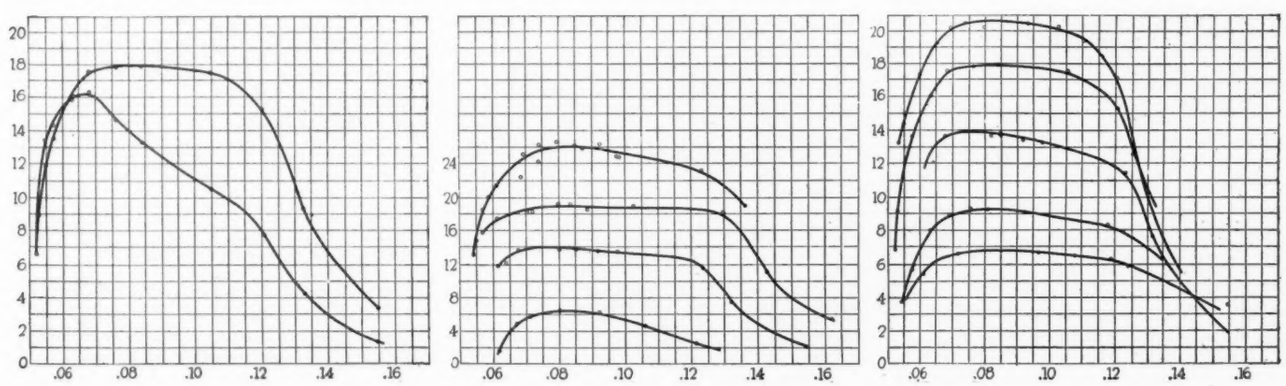
Livingston Receives Perpetual Injunction

NEW YORK, Dec. 16—A decree of perpetual injunction carrying costs and reference to a master of accounting for assessment of damages has been signed in favor of D. McRa Livingston and his licensee, the Ospeco Mfg. Co. against the Lowe Motor Supplies Co.

As reported in THE AUTOMOBILE for Nov. 23, the suit alleged that the Lawco



Figs. 1, 2 and 3, reading from left to right. Fig. 1 shows horsepower curves as the mixture strength varies from .05 to .16 lb. of gasoline to 1 lb. of dry air. Fig. 2 and Fig. 3 show similar curves taken at different speeds and loads. All the curves show the mixture has a great effect on power, but that there is a "flat" period where slight variation in mixture does not greatly affect the power

radiator shell and hood made by the F. H. Lawson Co., Cincinnati, Ohio, and sold by the Lowe concern infringed the Livingston patent No. 1,156,017 covering a mask for concealing the engine and radiator casing of a car. Judge Sheppard held the patent valid and infringed, although commenting that no wilful infringement was evident. The case was in the U. S. District Court for the Southern District of New York.

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Nelson Builds Four at $2,350

DETROIT, Dec. 20—E. A. Nelson, designer of Hupmobile models 20 and 32, has started the manufacture of a high quality light weight four, selling at $2,350 with a sedan body. The enterprise is financed by Mr. Nelson and the plant has a capacity of ten cars per day. Dealers have been closed in the principal eastern centers and cars shipped. The car incorporates a 3⅛ by 4¾-in. overhead camshaft engine with clutch, gearset and axle in a unit. It is designed for high economy and low grade gasoline, a mileage of 25 and better to the gallon being guaranteed; acceleration is 5 to 35 m.p.h. in 13½ sec. Wheelbase is 104 in. and the cord tires are 32 by 4. Carbureter is a Zenith, and starter is U-S-L. The entire car will be made in the Nelson plant.

—

Globe Tire Co. Buys Plant

LAPORTE, IND., Dec. 19—The Globe Tire Co., a corporation capitalized at $2,500,000, has bought the plant of the H. B. Glover Co. A. A. Peterson, formerly assistant superintendent of the Fiske Rubber Co., who will be superintendent of the plant, states that the company expects to have the plant in operation by March 1 manufacturing semi-solid rubber tires and inner tubes.

—

Hutchinson to Make Truck Equipment

MILWAUKEE, Dec. 16—R. W. Hutchinson, for the past 3 years general sales and advertising manager for the Sterling Motor Truck Co., Milwaukee, and its predecessors, the Sternberg Mfg. Co. and Sternberg Motor Truck Co., has resigned, effective Feb. 1, to devote himself to the manufacture of motor truck efficiency auxiliary equipment.

—

New Company Takes Schmid-Lyon

DETROIT, Dec. 18—Ossian G. Lyon has taken out papers for a new rubber concern at Akron, Ohio, with a $150,000 capital. The new organization will take over the factory buildings and business of the Schmid-Lyon Rubber Co. Mr. Lyon, who is the president of the new concern, states that it is planned to widely extend the business.

Line Drive Tractor Factory

$1,000,000 Company Plans To Establish Permanent Plant at South Milwaukee

MILWAUKEE, Dec. 18—The Line Drive Tractor Co., Pierre, S. D., organized recently with $1,000,000 capital and financed to a large extent by Milwaukee capital, is preparing to establish its permanent factory at South Milwaukee. Materials have been purchased for the initial issue of 1200 machines, which are unique because steering and operation is manipulated by a pair of lines, the operator being seated on the wagon, implement or vehicle being drawn by the tractor. The organization includes the following well-known engineers: David E. Ross, of the Ross Tool & Gear Co., Lafayette, Ind., chief consulting engineer; I. W. Davis, superintendent of the Stowell Co., South Milwaukee, superintendent of construction; R. S. Strader, manager of the service department. Mr. Strader for eight years was associated with the M. Rumely Co., Hart-Parr Co. and Detroit Tractor Co.

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Brunswick Tire Plant Nearly Ready

MUSKEGON, MICH., Dec. 20—The Brunswick-Balke-Collender Co., by Jan. 15 will be manufacturing Brunswick tires and tubes at the rate of 500 per day. Before that date the new buildings will be completed and the machinery installed. Already the superintendents for the different departments of the factory are on hand and the manufacturing organization practically completed. In addition to manufacturing tires and tubes a line of rubber accessories will be produced.

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K. W. Ignition Buys Land

CLEVELAND, Dec. 15—The K. W. Ignition Co. has purchased a parcel of land adjoining the company's plant. The recently acquired land is 60 by 245 ft.

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Willard to Erect New Building

CLEVELAND, Dec. 18—The Willard Storage Battery Co. will erect a factory building to cost $35,000, and a storage building at $7000.

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Reo Employees Co-operate to Reduce Cost of Living

LANSING, MICH., Dec. 16—More than 4500 employees of the Reo Motor Car Co. are experimenting with a co-operative purchase plan in an endeavor to reduce the cost of living. The first experiment was the purchase of two carloads of potatoes which effected a saving of 25 per cent above all cost. The workers are now bargaining for several carloads of canned goods which will be sold to the individual employees in case lots from the cars. Plans for a co-operative coal yard and general store are contemplated.

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Harrison With Harroun

DETROIT, Dec. 14—John B. S. Harrison has been appointed the manager of the foreign department of the Harroun Motors Corp. Mr. Harrison was formerly a member of the United States embassy at Rome.

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Republic Workers Have Co-operative Store

DETROIT, Dec. 16—The employees of the Republic Motor Truck Co., Alma, Mich., have organized a co-operative store which will purchase every kind of merchandise for its 900 members.

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New International Rubber Sales Co.

LOUISVILLE, KY., Dec. 16—The New Tread Tyre Co. has changed its name to the International Rubber Sales Co.

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Shaler Acquires Vulcanizer Patents

WAUPUN, WIS., Dec. 18—The C. A. Shaler Co., this city, has absorbed the vulcanizer business of the 5-Minute Vulcanizer Co., Kansas City, and the Vulcan Mfg. Co., Denver. The Shaler company states that it has recently acquired from W. H. Miles of Longton, England, and A. B. Low, of Denver, three basic patents, covering types of vulcanizers in which a solid fuel is used to produce the heat.

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Parker Rust Proof Buys Patents

DETROIT, Dec. 14—The Parker Rust Proof Co. of America has completed negotiations for the purchase of the Thomas Watts Coslett patents No. 870,937 and No. 1,007,069, and all other improvements which may be made in rust proofing by Mr. Coslett. This purchase, according to officials of the Parker Rust Proof Co., gives that company control of the entire rust proofing art.

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Lytle Joins Anderson Motor Co.

ROCK HILL, S. C., Dec. 15—R. W. Lytle has joined the Anderson Motor Co., this city, as production manager. He was formerly engineer and production of the Bimel Automobile Co., Sidney, Ohio.

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Peerless Asks New Trial

CLEVELAND, Dec. 20—The Peerless Motor Car Co. has asked for a new trial of the suit brought against it by Henry S. Chapman for $800,000 alleging violation of contract. A verdict of $375,000 with interest, totaling $412,812, was recently awarded Chapman.

154,525 Overland Cars Sold

More Than 6,500 Dealers and Guests Entertained at 2-Weeks Convention

TOLEDO, Dec. 16—Contracts totaling 154,525 automobiles with a value of $131,346,250 have been signed during the first two weeks of the Willys-Overland Co.'s dealers' convention. More than 6500 dealers and guests have been entertained during that length of time.

The business of this past week, amounting to 66,975 cars with a value of $56,928,750, was received from dealers from the zones of the Middle West, New England and the South. The first group ordered 29,200 cars, the second 24,025 and the third 13,700 cars. The convention will come to a close next week. The South Dakota, Minnesota, Wisconsin and Eastern Iowa dealers will visit the company on Monday and Tuesday, and the New York, Indianapolis, Cincinnati, Lexington, Louisville, Lima and Evansville dealers will bring the event to its end on Wednesday and Thursday.

The most important feature of this week, aside from the industrial achievements was a parade held on Thursday, when the various guests and many employees joined a march, with many novel floats, through the city. More than $150,000 worth of cars were used.

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Kelly-Springfield Tire May Show 40 per Cent for Common

NEW YORK, Dec. 20—The Kelly-Springfield Tire Co., it is stated, will show earnings of at least 40 per cent for its $5,000,000 common stock. This compares with 29.67 per cent in 1915. Earnings of 40 per cent would be two and one-half times the present dividend rate.

—

$10,500,000 Profits for Studebaker

DETROIT, Dec. 20—The Studebaker Corp., this city, it is stated, will show profits of between $10,500,000 and $10,800,000 during its fiscal year ending Dec. 31. The smaller figure is equal to 32 per cent on the $30,000,000 common after taking out the approximately required $800,000 for the preferred dividend on $10,965,000 stock. This compares with 27.4 per cent for the common stock in 1915.

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Willys Addresses Insurance Presidents

TOLEDO, Dec. 15—John N. Willys, president of the Willys-Overland Co., accepted the invitation of the Association of Life Insurance Presidents and appeared before that body last night, with an address on the public services and patriotism of the American business man. In the course of his speech, Mr. Willys pointed out the vast growth of the automobile industry, assured his listeners that, in event of war, the automobile makers could be relied upon to use their machinery and factories for defense, and showed how France had twice been saved by automobile. He spoke optimistically of the future following the war, and dwelt at length on the vast welfare wrought to every human being by the automobile.

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Governors Plan Uniform Laws for Pa., N. J., Md. and Del.

WILMINGTON, DEL., Dec. 18—Governor Charles R. Miller and Secretary of State George H. Hall of Delaware a few days ago attended a conference of similar officials representing Pennsylvania, New Jersey and Maryland, which was held in Philadelphia, the purpose being to consider the matter of uniform motor laws for the four States.

A thorough understanding was reached, according to one of those who attended the conference, and it is believed that the desired object will be accomplished in the near future.

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To License Repair Men

DETROIT, Dec. 18 — Representative Charles W. Clark of Michigan, is planning to introduce a bill in the State Legislature which will provide for the licensing of all garage men who are employed in automobile repair work.

Inasmuch as every member of the Legislature is a car owner it is believed that he has an excellent chance of getting his proposed bill passed in the next session.

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$70,000,000 Sales for Goodrich

AKRON, Dec. 15—Sales of the B. F. Goodrich Co. for 1916 will total nearly $70,000,000, as compared with 56,000,000 in 1915 and $43,000,000 in 1914. Earnings in the first 6 months of this year amounted to 6½ per cent on the $60,000,000 common.

G. M. C. Certificates Listed

Temporary Certificates on N.Y. Stock Exchange Balance Sheet as of Dec. 9.

NEW YORK, Dec. 19—The temporary certificates of the General Motors Corp., of $20,000,000 preferred and $82,600,000 common, have been listed on the Stock Exchange. The corporation was formed to take over the stock of the General Motors Co. Of the $45,314,000 common of the corporation outstanding on Dec. 9, the Chevrolet company held $16,644,500 in its treasury in one certificate.

It is also stated that the Chevrolet Motor Co. agrees that the shares of common stock of the General Motors Corp. acquired by it will be kept in its treasury and that the Chevrolet Motor Co. will not part in any manner with any of these shares without first publishing notice of its intention to do so at least 60 days in advance.

The balance sheet of the General Motors Corp. of Delaware as of Dec. 9, 1916, appears herewith:

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Pyrene to Increase Capital

NEW YORK, Dec. 20—The Pyrene Mfg. Co., this city, has called a meeting of the stockholders on Jan. 2, at which action will be taken on a proposed increase of capital from $1,050,000, divided into 100,000 shares of common, and 5000 shares of preferred, each to $3,050,000 divided into 300,000 shares of common of $10 par value, and 5000 shares of preferred, of $10 par value.

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Simplex Capital Now $9,000,000

DOVER, DEL., Dec. 15—The Simplex Automobile Co. of New York has increased its capital from $5,000,000 to $9,000,000.

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Dixie Increases Capital to $400,000

LOUISVILLE, KY., Dec. 16—The Dixie Motor Car Co. has increased its capital from $150,000 to $400,000, divided into 4000 shares of a par value of $100 and

Balance Sheet of General Motors Corp. of Delaware as of Dec. 9

Assets	
91,664 shares preferred stock General Motors of New Jersey	$12,221,867
90,628.25 shares common stock General Motors of New Jersey	45,314,137
Cash in bank	3,528
Organization expense to Dec. 9, 1916	11,472
Total	$57,551,004
Liabilities	
Preferred stock authorized	$20,000,000
Less amount to be issued in exchange for preferred stock	7,804,000
General Motors of New Jersey	$12,196,000
Preferred outstanding	
Common stock authorized	82,600,000
Less amount to be exchanged for General Motors of New Jersey	37,285,900
Common outstanding	*$45,314,100
Bills payable	15,000
Accounts payable	25,904
Total	$57,551,004

*Of this amount $16,644,500 is owned by Chevrolet Motor Co. and held in its treasury in one certificate.

authorizing an indebtedness not to exceed $1,000,000. One-half of the stock is to be common and one-half preferred and the additional issue of 1000 shares of common is to be held in the treasury of the company and issued to the present owners of common stock as it is subscribed for them by them and paid for in cash.

The preferred stock is to pay 7 per cent dividends, one-half Jan. 1 and one-half July 1 of each year.

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Midland Tire Capital Now $500,000

COSHOCTON, OHIO, Dec. 18—Papers have been filed with the Secretary of State increasing the authorized capital of the Midland Tire & Rubber Co., from $10,000 to $500,000. The concern has taken over the plant of the McClurg Tire Co.

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Lockwood-Ash Increases Capital

JACKSON, MICH., Dec. 18—The Lockwood-Ash Motor Co., Jackson, Mich., has increased its capital stock from $20,000 to $150,000. A distribution of $89,500 surplus furnished the increase with a balance of $40,000 which will be left open for future needs.

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East Palestine Capital $1,000,000

EAST PALESTINE, OHIO, Dec. 15—The East Palestine Rubber Co., this city, manufacturing tires, has increased its capital from $500,000 to $1,000,000 to take care of additions to the plant. A new building will be erected, 200 by 55 ft., and will have a capacity of 200 tires a day.

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Warner Cuts Capital Stock

DETROIT, Dec. 16—The Warner Mfg. Co. of Toledo has reduced its capital stock from $500,000 to $50,000. The Toledo plant of this company was recently sold to the Chevrolet Motor Co.

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Briggs-Detroiter Capital Reduced

DETROIT, Dec. 16—The Briggs-Detroiter Co. has decreased its capital stock from $200,000 to $2000, and has changed its name to the United Detroiter Corp.

Gasoline Goes Up 1 Cent

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Advance Throughout Country —Standard Oil and Other Companies Join In

NEW YORK, Dec. 18—Gasoline is higher throughout the country, especially throughout the western States. As yet no rise has occurred along the Atlantic Coast. One-cent rises are reported from Chicago, Milwaukee, Tacoma, St. Louis, and Minneapolis.

The Standard Oil Co. of Indiana to-day advanced its tank wagon price 1 cent a gallon in Chicago to 17½ cents. In the Northwest prices are now quoting at 20½ cents at filling stations. This figure is a new record there. In the Twin Cities, gasoline is retailing at 17½ cents. This is the first advance since the agitation was begun for investigation of the gasoline situation. Standard Oil gasoline in St. Louis is quoting at 16.9 cents a gallon at stations and on tank wagons. Naphtha is selling at 16.4 cents. Independents have been selling gasoline for 17 cents. Pierce Oil Corp. is still selling gasoline in St. Louis for 15.9 cents a gallon, but an advance is expected soon.

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Hayes Capitalization Plans Perfected

DETROIT, Dec. 18—If the present plans of the Hayes Mfg. Co. are approved, stockholders will receive a stock dividend of 75 per cent, as it is proposed to increase the capital to $1,750,000 of which $250,000 will be 7 per cent cumulative preferred stock. Under the plan the present preferred stock will be retired.

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Westinghouse Limits Stock Subscription

CLEVELAND, Dec. 15—Notices will be sent to Westinghouse Electric stockholders shortly after Dec. 30, specifying the amount of stock to which the stockholder is entitled to subscribe. Warrants entitling the holder to subscribe will be issued only for amount of $50 or multiples thereof. For each fraction of a share, a fractional warrant or fractional warrants will be issued. After Feb. 19, 1917, fractional warrants will be void. No subscription may be made on a fractional warrant but if surrendered on or before Feb. 19, 1917, to the United States Mortgage & Trust Co. with other fractional warrants aggregating at least $50, a subscription warrant for one share will be issued in exchange.

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United Motors Co. Raises Capital

DETROIT, Dec. 18—The United Motors Co. of Grand Rapids, has increased its capital from $1000 to $750,000. The increase has been paid in in cash by the incorporators, and officials of the company state that the concern is in excellent financial standing with no bonded or floating debts. Officers of the company recently elected, are: Frank D. Hulswit, president; George P. Sweet, vice-president; H. R. Green, treasurer; L. H. Einke, secretary, and K. A. Myers, assistant treasurer.

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Two Companies Will Pay Off $4,000,000

DETROIT, Dec. 18—The Youngstown Sheet & Tube Co. and the Brier Hill Steel and Trumbull Steel companies will pay off bonds totaling $4,000,000, canceling all of their outstanding surplus of the character in January. They will also grant employees a 10 per cent advance, the third for the year, which will contribute approximately $600,000 to the workers.

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Material Prices Drop

NEW YORK, Dec. 18—Materials dropped considerably in price last week. Copper went down 1 cent to 34 cents a lb., lead dropped to $7.63, a loss of 47 cents per 100 lb., both Para and Ceylon grades of rubber closed yesterday lower, and tin was also lower. Only one gain occurred and that was Kansas crude, which rose to $1.20 per barrel, a gain of 10 cents.

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Fostoria Co. to Change Name

DETROIT, Dec. 18—The Fostoria Light Car Co. stockholders will meet Jan. 8 to reorganize the company and elect new officers, besides changing the name of the concern to the Seneca Motor Car Co.

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McCord Assets $1,875,000

NEW YORK, Dec. 20—The McCord Mfg. Co., Detroit, maker of automobile radiators, which last week authorized an issue of $1,000,000 of 7 per cent cumulative preferred stock and 75,000 shares of common stock, no par value, reports net tangible assets over $1,875,000, or two and one-half times the preferred issue. Net quick assets alone are $1,000,-

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum, lb.	.63	.63	.63	.63	.63	.63	...
Antimony, lb.	.14½	.14½	.14¾	.14⅜	.14⅜	.14⅜	— .00⅛
Beams and Channels, 100 lb.	3.42	3.42	3.42	3.42	3.42	3.42	...
Bessemer Steel, ton	55.00	55.00	55.00	55.00	55.00	55.00	...
Copper, Elec. lb.	.35	.35	.35	.34	.34	.34	— .01
Copper, Lake, lb.	.35	.35	.35	.34	.34	.34	— .01
Cottonseed Oil, bbl.	12.40	12.35	12.20	12.48	12.20	12.25	— .15
Fish Oil, Menhaden, Brown, gal.	.72	.72	.72	.72	.72	.72	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime, gal.	1.30	1.30	1.30	1.30	1.30	1.30	...
Lead, 100 lb.	8.10	7.90	7.75	7.63	7.63	7.63	— .47
Linseed Oil, gal.	.93	.93	.93	.93	.93	.93	...
Open-Hearth Steel, ton	55.00	55.00	55.00	55.00	55.00	55.00	...
Petroleum, bbl., Kans., crude	1.10	1.10	1.10	1.10	1.20	1.20	+ .10
Petroleum, bbl., Pa., crude	2.75	2.75	2.75	2.75	2.75	2.75	...
Rapeseed Oil, refined, gal.	.98	.98	.98	.98	.98	.98	...
Rubber, Fine Up-River, Para, lb.	.81	.81	.80½	.79	.79	.79	— .02
Rubber, Ceylon, First Latex, lb.	.80	.77	.77	.77	.75	.75	— .05
Sulphuric Acid, 60 Baume, gal.	1.50	1.50	1.50	1.50	1.50	1 50	...
Tin, 100 lb.	42.75	43.00	43.00	43.00	43.00	42.63	— .12
Tire Scrap, lb.	.06¼	.06½	.06½	.06½	.06½	.06½	+ .00¼

000, or one and one-third times the preferred issue.

Net earnings for 12 months ended Oct. 31, 1916, were over $563,000 or more than ten and one-half times the preferred dividend requirements. In 1915 the company did a business amounting to $2,569,-051, and earnings amounted to $324,472.

The company was organized in 1909 and has increased its plant space from 40,000 sq. ft. to approximately 300,000 sq. ft., with a capacity of 2000 radiators a day. It also manufactures gaskets for steam and gas engines, lubricators, etc.

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Dividends Declared

Electric Storage Battery Co., 1 per cent from net earnings on both common and preferred, payable Jan. 2 to stock of record Dec. 18.

Keystone Tire & Rubber Co., quarterly of 3 per cent on common and 2 per cent and an extra of 1-3 of 1 per cent on preferred. Three months ago the company declared quarterly of 2 per cent and extra of ¾ of 1 per cent on common and quarterly of 2 per cent and extra of ¼ of 1 per cent on preferred.

National Carbon Co., quarterly of 2 per cent and extra of 2 per cent on common, payable Jan. 15 to holders of record Jan. 15.

Pyrene Mfg. Co., 2½ per cent on common, payable Feb. 1, 1917, to stock of record Jan. 25, 1917.

Saxon Motor Car Corp., 1¾ per cent, payable Jan. 17 to stock of record of Jan. 3.

Big Drop in Motor Securities

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General Motors Down 50 Points—United Motors Falls 9¾—Fisk Strong

NEW YORK, Dec. 18—The automobile issues joined in the general slump of stocks which has for the past two weeks been the cause of heavy losses in speculation. With few exceptions was there any tendency toward strength in the issues. Not only was there liquidation in the automobile issues but also in the tire stocks.

One of the most prominent drops last week was that of General Motors, which went down to 600, a loss of 50 points. Another stock, which has been speculated on to a great extent, but which has failed to hold up to the estimation predicted for it, is United Motors. This stock is one of the strongest in point of assets on the motor securities market, yet it has failed to show any material strength during the present slump. Yesterday it quoted at 49¾, as against 69 several months ago. Willys-Overland has been holding better lately. Chevrolet, on the other hand, probably in sympathy with the General Motors slump, has fallen down to 142, a drop of 28 points in the past week.

Tire issues were in the majority of cases lower. Ajax went down 6⅛ points; Goodrich common dropped 4⅜ points and the preferred 2½ points; Goodyear common dropped 3 points; Firestone went down 15 points to 135, and United States Rubber common dropped 3¼ points.

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Winther Truck Elects Officers

KENOSHA, WIS., Dec. 18—The Winther Motor Truck Co., Kenosha, Wis., organized recently with $300,000 capital to manufacture motor trucks, has perfected its organization with the election of these officers: President and general manager, Martin P. Winther; vice-president and factory manager, William Martinson; secretary, treasurer and sales manager, Walter D. Rightmire; directors, M. P. Winther, William Martinson, W. D. Rightmire, Jerry W. DeCou and Walter M. Burke. The truck will be known as the Winther. A specialty will be made of fire-fighting apparatus, and the Winther company has effected an alliance with the Peter Pirsch Co., Kenosha, Wis., fire apparatus, for the joint production of such cars, to be trademarked Pirsch-Winther. A factory will be erected by the Winther company immediately on a 4-acre site just purchased at the western limits of Kenosha.

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Temple of Flowers for New York Show

NEW YORK, Dec. 18—The Temple of Flowers is the theme selected by Manager S. A. Miles, of the N. A. C. C., for the decorative plan of the New York Show at Grand Central Palace.

Mammoth lattice boxes containing flow-

Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
Ajax Rubber Co.	80	81	—6⅛
J. I. Case T. M. Co. pfd.	85¼	87	—1
Chalmers Motor Co. com.	130	150	—5
Chalmers Motor Co. pfd.	105	115	..
*Chandler Motor Car Co.	103	105	—7
Chevrolet Motor Co.	142	147	—28
Fisher Body Corp.	38	41	..
Fisk Rubber Co. com.	70	80	..
Fisk Rubber Co. 1st pfd.	110	115	+10
Fisk Rubber Co. 2d pfd.	90	100	..
Firestone Tire & Rubber Co. com.	135	140	—15
Firestone Tire & Rubber Co. pfd.	107	108	— ½
*General Motors Co. com.	600	800	—50
*General Motors Co. pfd.	114	118	— ½
*B. F. Goodrich Co. com.	63⅞	64¼	—4⅜
*B. F. Goodrich Co. pfd.	113½	113⅝	—2½
Goodyear Tire & Rubber Co. com.	290	295	—3
Goodyear Tire & Rubber Co. pfd.	108¾	109¾	— ¼
Grant Motor Car Corp.	7	9	..
Hupp Motor Car Co. com.	3½	4½	..
Hupp Motor Car Corp. pfd.	80	100	..
International Motor Co. new com.	10	20	—4
International Motor Co. 1st pfd.	50	80	—10
International Motor Co. 2d pfd.	30	50	..
*Kelly-Springfield Tire Co. com.	67½	68	—4¾
*Kelly-Springfield Tire Co., 1st pfd.	95	99	..
Keystone Tire & Rubber Co.	17⅜	17½	+1⅝
*Lee Rubber & Tire Corp.	33	33½	+1¼
*Maxwell Motor Co. com.	59	60	—11⅝
*Maxwell Motor Co. 1st pfd.	70	70¼	—9⅜
*Maxwell Motor Co. 2nd pfd.	40	42	—7
Miller Rubber Co. com.	250	257	—3
Miller Rubber Co. pfd.	106	107½	..
Packard Motor Car Co. com.	170	180	—3
Packard Motor Car Co. pfd.	100	103	—1
Paige-Detroit Motor Car Co.	40½	41	—1
Peerless Truck & Motor Corp.	18	22	—3
Portage Rubber Co.	..	181	..
Regal Motor Car Co. pfd.	20	30	..
Reo Motor Car Co.	40	42½	—5¾
Saxon Motor Car Corp.	73	74	—3
A. O. Smith Corp. pfd.	96	..	— ½
Springfield Body Corp. com.	90	105	—5
Springfield Body Corp. pfd.	120	130	..
Standard Motor Construction Co.	5	7	—1¾
Stewart Warner Speed. Corp. com.	102	103	..
Stewart Warner Speed. Corp. pfd.	..	..	..
*Studebaker Corp. com.	112	113	+3½
*Studebaker Corp. pfd.	..	..	..
Swinehart Tire & Rubber Co.	..	87	..
United Motors Corp.	49¾	50¼	—9¾
*U. S. Rubber Co. com.	65½	65¾	—3¼
*U. S. Rubber Co. pfd.	111⅝	112	—1⅜
White Motor Co.	48½	49	—10½
*Willys-Overland Co. com.	36⅛	36½	—1⅛
*Willys-Overland Co. pfd.	98½	100	— ½

*At close Dec. 18, 1916. Listed New York Stock Exchange.
Quotations by John Burnham & Co.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	48	..
Chalmers Motor Co. com.	..	132	..
Chalmers Motor Co. pfd.	110	..	—2
Continental Motor Co. com.	44	44¾	—3½
Continental Motor Co. pfd.	9½	..	— ¼
Ford Motor Co. of Canada	..	285	..
General Motors Co. com.	..	800	..
General Motors Co. pfd.	118½	121½	..
Maxwell Motor Co. com.	62	66	—11
Maxwell Motor Co. 1st pfd.	79	83	—2
Maxwell Motor Co. 2d pfd.	40	45	—9
Packard Motor Car Co. com.	..	175	..
Packard Motor Car Co. pfd.	..	102	..
Paige-Detroit Motor Car Co.	39	40½	—2¾
W. J. Prudden Co.	50	51¾	—3⅝
Reo Motor Car Co.	42	42¼	—3¼
Studebaker Corp. com.	112	116	—7
Studebaker Corp. pfd.	107	..	..
C. M. Hall Lamp Co.	..	30½	..

INACTIVE STOCKS

Atlas Drop Forge Co.	30	34	..
Kelsey Wheel Co.	55	60	..
Regal Motor Car Co. pfd.	25	30	..

ers of varied hue are to be used at the base of the giant marble columns on the main floor of the building. From the boxes will issue trailing vines which will reach to the top of the columns and twine about huge floral baskets of Roman type. A window frame of colonial design will be installed at each window on the main floor and behind the frame will be hung scenic paintings which will give the visitor the impression of looking outdoors. Dotting the walls between the windows will be installed a number of large mirrors and the reflection of the cars in these will add breadth to the interior. At the rear of the building huge draperies will hang, giving a rich background effect to the decorative plan.

The lobby to the Palace will be decorated with bay trees and flowers. Six large scenic paintings will be hung on the walls of the lobby.

The signs of the exhibitors will be made up of white letters on a red background in a gold border. The colors of the show will be white and green with red much in evidence.

—

Spark Plug Men Meet

DETROIT, Dec. 19—The fourth annual convention of Champion spark plug salesmen opened in Toledo yesterday, with visitors from all parts of the country. The convention will last for 4 days and the guests will include lectures, trips through the factory, luncheons and a huge banquet among their activities.

The company plans an output of 75,000 spark plugs per day during the next year and expects to instill highest efficiency selling principles in the salesmen to insure correct handling of such a large production.

—

Sparks-Withington Cleveland Branch

CLEVELAND, Dec. 18—The Sparks-Withington Co., Jackson, Mich., will maintain a branch office in Cleveland. A. A. O'Reilly will be in charge.

—

Nichoalds Branch in Indianapolis

DETROIT, Dec. 18—The Nichoalds Co., Detroit, retailer and jobber in motor car parts and accessories, will open a branch in Indianapolis Jan. 2. T. A. Nichoalds will be branch manager.

—

Renfro Sparks-Withington Sales Agent

JACKSON, MICH., Dec. 16—The Sparks-Withington Co., this city, has selected J. F. Renfro as Eastern Sales Agent, with offices at 1834 Broadway, New York, becoming effective Dec. 15. His territory comprises New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia and the District of Columbia. Mr. Renfro has been connected with the selling branch of the industry for a number of years.

Tire Prices Soon to Increase

—

20% Rise Expected, Due to Increased Cost of Materials and Manufacture

NEW YORK, Dec. 18—The rise in the prices of tires, threatened for the past few weeks, is not far off, according to the rubber trade in general. Prices are expected to go up at least 20 per cent. The material scarcity and their unprecedented prices have been the main reasons for the rise. Though rubber has not risen exorbitantly, the other materials which go into the makeup of tires have risen on an average about 20 per cent. For instance, tire fabric, one of the important parts of the tire, has risen in price about 100 per cent. Chemicals, cotton, labor, rent, shipping conditions, all have had their potent effect on prices.

Advise Immediate Purchase

A few of the tire companies are looking to the future by advising their dealers to get in their tires immediately. One prominent concern is taking no large orders, but advises its dealers to buy at present prices.

One of the largest companies is guaranteeing its prices for three months. Other concerns state that there is no logical reason why prices should not go up at the present time, that they are waiting for some company to take the initiative in the matter. And for that reason some of them are not accepting orders for future delivery at guaranteed prices.

The high cost of fabric has been largely responsible for the threatened rise. Tire fabric has gone up on account of the big scarcity of Egyptian and Sea Island cotton, two of the most popular grades used. Submarine warfare, weather conditions, and manipulation on the Alexandrian Exchange were responsible for a big rise in Egyptian cotton. Great Britain is largely in control of the Sea Island cotton, which is mainly contracted for before the American tire makers or duck makers have a chance to buy. These conditions, together with the cotton scarcity along the Atlantic Coast, naturally caused an increase. The cotton along the Atlantic Coast, in the Carolinas and Virginia, is the only grade in this country that is suited for tire manufacture.

—

Eleventh Edition National Used Car Report

CHICAGO, Dec. 18—The eleventh edition of the National Used Car Market Report has been issued by the Chicago Automobile Trade Association. Zone 11, centering in Dallas, is still missing.

New names in the list are: Arbenz, Biddle, Bour-Davis, Cameron, Daniels, Dispatch, Dixie, Elcar, Elgin, Hackett, Hollier, Jordan, Laurel, Madison, McIntyre, Monitor, Monroe, Owen Magnetic, Roamer, Singer, Spaulding, Sun and Woods Gas-Electric. There are 163 gasoline cars and 15 electrics listed, as compared with 139 gas and 14 electrics in the tenth addition. The pocket edition accompanies the larger edition, containing the data in abbreviated form.

—

National Rubber Co. Increases Mileage Guarantee

POTTSTOWN, PA., Dec. 16—For 1917 the National Rubber Co., this city, is placing on the market a new gray tread speedway tire which will be guaranteed on the basis of 5000 miles' service.

The list price of the new tire will be slightly higher than its ebony tread speedway, but because of the larger mileage guarantee the price of the new tire is actually less, when figured from the mileage viewpoint.

The company does not contemplate any increase in the price of its new gray tread tire.

—

Dunlop Originated Cycle Tire

NEW YORK, Dec. 14—The Michelin Tire Co. advises us that in an advertisement of theirs appearing in a recent issue of THE AUTOMOBILE, it was stated that Michelin invented the bicycle tire. This was a mistake. What should have been said was, the first detachable bicycle tire. The invention of the pneumatic tire dates back to the middle of the last century, and J. B. Dunlop originated the first successful pneumatic bicycle tire in Ireland in 1888.

—

Gerlinger Tractor Attachment for $275

TACOMA, WASH., Dec. 16—The Gerlinger Motor Car Co., Tacoma, has placed a tractor attachment on the market which may be attached to any small car. The price is $275. It is known as the Universal tractor attachment.

—

To Build Trucks in Cork

MANCHESTER, ENGLAND, Dec. 10—The city park of Cork, Ireland, is to be used for the manufacture of commercial vehicles. The Trafford Engineering Co., this city, has taken an option on that park upon which it will erect a plant to cost between $1,000,000 and $2,000,000. The company plans the manufacture of worm-drive trucks on a large scale. It will employ 2000 men.

—

J. W. Packard Presides Over Buffalo Co.

DETROIT, Dec. 16—J. W. Packard has been elected president of the Packard Buffalo Motor Co., Inc., which recently purchased the Buffalo interests of the Packard Motor Car Co., of New York.

Mr. Packard owned the small electrical shop at Warren, Ohio, where the first Packard car was made. He was the first president of the Packard Motor Car Co. and was later chairman of the board of directors. Four years ago he resigned and retired to Lakewood, N. J. The Packard Buffalo company is the result of financial aid from Mr. Packard and his brother, W. D. Packard. It will be managed by B. C. Day, who was formerly in charge of the Buffalo branch for the Packard Motor Car Co., of New York.

—

Hare Heads N. Y. Packard

NEW YORK, Dec. 16—Emlen S. Hare, formerly general manager of the New York branch of the Packard Motor Car Co., has been promoted to the head of that organization. L. J. Eastman has been elected as president and director of the Packard Motor Car Co. of Philadelphia.

—

Paige Distributers at Factory

DETROIT, Dec. 16—More than forty of the principal distributers of the Paige cars in the United States were visitors at the factory of the Paige-Detroit Motor Car Co. this past week. They witnessed the unveiling of the new models, listened to addresses made by Harry M. Jewett, president of the company, Henry Krohn, sales manager, and others, and spent a part of the time inspecting the factory, merchandising plans and efficiency and sales promotion work.

—

Not a Kent Representative

NEW YORK, Dec. 18.—Readers of THE AUTOMOBILE should beware of a man representing himself as the authorized agent of the Kent Motors Corp., to appoint territorial agents to whom a car was to be sent on consignment on payment of $5. The Kent corporation has no traveling representative. Before paying any money to so called agents of car manufacturers, it is best to communicate with the home office of the company on the matter.

—

Studebaker Dealers in Grand Rapids

DETROIT, Dec. 18—Forty-six Studebaker dealers from Western Michigan, units of the Becker Motor Car Co., Grand Rapids, met last week in that city, for a banquet and business discussion.

—

Herreshoff Co. in Bristol, R. I.

NEW YORK, Dec. 18—In THE AUTOMOBILE for Dec. 7, the location of the Herreshoff Mfg. Co., maker of the Novara car, was given as Bristol, Conn., whereas it should have been Bristol, R. I.

May Run 500-Mile at Cincinnati

—

Overcharging of Automobilists by Indianapolis Hotel Keepers May Cause Shift

INDIANAPOLIS, IND., Dec. 19—Carl G. Fisher, president of the Indianapolis Motor Speedway, announces he is considering plans for staging the annual 500-mile international sweepstakes race at the Cincinnati Motor Speedway on Memorial Day, because of the treatment accorded automobilists in Indianapolis by hotel keepers. Fisher is incensed because hotel owners have insisted on charging motorists who come here to attend the races as high as $25 a day for rooms for which the charge normally is from $2 to $4. He declared the speedway management can make as much if not more money by staging the race in Cincinnati. Fisher declared the attitude of Indianapolis hotel keepers has given the city a black eye with motorists throughout the entire country.

—

Indiana S. A. E. Talks Carburetion

(*Continued from page* 1037)

and 1600 r.p.m., with 100 lb. on the brake at full load.

We ran it with one-fourth load, one-half, three-quarters and full load. At each condition, say at 1300 revolutions, and 50 lb. brake load, we changed the mixture in the carbureter arbitrarily by changing the gasoline needle valve until the mixture was very lean, and kept increasing it until we got the engine running under the most powerful mixture—until we got to the point where the mixture would not increase the power of the motor at the same opening of the throttle.

After we got to 1300 revolutions and 50-lb. brake load we kept the throttle opening the same, and changed our brake load so as to hold the speed constant. We had the apparatus so arranged that we could weigh our gasoline to 1/100 part of an ounce. We metered the air and took the temperature into the meter and out. The vacuum was recorded and the humidity of the air was recorded, so we made an attempt to find out just how much dry air was used in each case. At the time it came to a balance it rang a gong and started a revolution counter on the end of the shaft, and then we took off the weights and set the switch again. Then, when it balanced again, it rang the gong, stopped the watch, and we knew the amount of air within 1 per cent, and knew the amount of gasoline to 1/100 part of an ounce. We recorded the amount of air, the temperature, pressure and humidity, the amount of gasoline used, and the power developed, and then we made a run.

We increased the mixture and got point No. 2, Fig. 1, and made a series of tests that way, increasing the gas in the mixture until the engine would no longer run. The curve, Fig. 1, shows the change in power due to the change in gasoline in the mixture; 0.05 of a pound of gasoline per pound of dry air, up to 16 hundredths pounds of gasoline per pound of dry air. We have very accurate figures. The perfect mixture is 0.0671 lb. gasoline to 1 lb. dry air.

The power is not quite maximum at the theoretically perfect mixture. For the range of mixtures you can get good power at 0.06 and still get good power at 0.12. You can double the amount of gasoline in the mixture and still carry almost full load, and I was unable to train myself so I could stand beside the engine and tell where in that range the motor was running. I could not tell by sound whether the engine was on the lean or the rich end.

The next point is the effect on efficiency. In all of these curves for all running conditions we have found the maximum efficiency seemed to be exactly at the point of the theoretically perfect mixture. Below perfect mixture the efficiency dropped off. If you increase above that your power drops off.

—

New Klaxon Three at $3

NEWARK, N. J., Nov. 6—The Klaxon Three, selling at $3, will be brought out Jan. 1 by the Klaxon Co., this city. It will operate on the push-from-behind principle. The push-from-the top principle which has heretofore been used in the Klaxon, has been abandoned in all models.

Upon the completion of a large addition now in process of construction, the Klaxon plant will be doubled in capacity. For 1917 the company announces a reduction in the number of models which it has made in the past. All facilities will be concentrated on a few standard models to be known as Klaxon 20, selling for $20; Klaxon 12, designed especially for use under the hood; Klaxon 6, a smaller electric horn for both outside and under-hood use at $6; and the new Klaxon Three.

—

Columbia Truck Increases Capital

PONTIAC, MICH., Dec. 19—The Columbia Motor Truck & Trailer Co., Pontiac, Mich., has increased its capital from $35,000 to $100,000. The additional stock was subscribed for by several private individuals. The company plans to erect another additional building.

—

Dickinson With Champion Motors

FULTON, ILL., Dec. 18—D. M. Dickinson has been appointed director of sales for the Champion Motors Co., Inc.

The Automobile

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Better Cars

IN summing up all the changes in engineering noted on the 1917 cars there is but a paltry total if the design changes of last year are compared with those of the present one. But design is only a part of the task of making good automobiles, and 1916 has been a banner year for the manufacturing side, which does work that is much less spectacular than that of the engineering departments.

There is no object in trying to blink the fact that some manufacturers have increased production at the expense of the quality of their cars, that some of the new systems and processes have exhibited troubles during the year, and that the vastly improved designs produced in 1915 have not always had the perfection of manufacture during 1916 of which they were worthy. But troubles as they arose have been caught in the early stages and the probability is that 1917 will be a year in which average workmanship will be improved very greatly, following the steady improvement that has been taking place throughout the year now drawing to a close.

When a huge new machine is set up—a big printing press, a large turbine, a ship's engines and so on—it is always some little time after first starting up that everything is running smoothly. Last year the automobile manufacturers re-created their factories, made bigger machines of them, and we have had the period of settling down to go through. We have now passed this period, or at least the worst of it, and can look forward confidently to better and even more economically made cars in 1917.

The Parking Problem

EVERY day in big cities the parking problem grows more acute. If it is bad to-day, and indeed it is so, what will be the situation in 3 years?

We are facing something which was never foreseen in the planning of our towns, a thing which has come upon us so swiftly that there has been no time to grasp the immensity of the problem till we are almost overcome by it.

At present we need some definite ideals to work for. The big cities are now trying to handle the matter by prohibiting parking in the main thoroughfares, but this is not a solution of the difficulty; it merely postpones the task of settling the thing properly and makes that settlement more difficult in the end.

One, almost ideal method is to have streets so wide that a central strip 30 to 40 ft. wide can be given over to parking, leaving enough road for traffic on either side, but obviously this can only be considered in very new towns with their future before them.

For existing big cities we have three schemes, large municipal garages, underground parking "cellars" and overhead roads. Of the three the first is not a good solution. To get the greatest benefit from the machine the automobile should be parked close to the place where its user is at the time. Very many scattered, small parking places are much better than a few immense garages.

There is one big opportunity for doing something with the huge garage and this is in the few biggest cities of all where transportation of all kinds is good. Here big garages just outside the congested area would be an immense advantage. In New York, for instance, they might be just off or just on Manhattan at the points where the main roads enter and link with the public service surface and subway systems.

The underground scheme has excessive cost against it, and also the need for perpetual artificial light and the probable difficulty of getting in and out. Yet, if we cannot widen our streets it seems the only other answer is to double then by going above or below. The elevated road would be costly, but it does seem to be the more plausible scheme.

The elevated road should be considered from the viewpoint of its advantage to through traffic. Take a city with a half dozen radial roads where it is necessary to cross town to get from one side to the other. In such places an elevated system would remove all through traffic from streets where the shopping and similar traffic abounds. Imagine Detroit with an overhead Woodward Avenue connecting to Jefferson and to several points on the Boulevard; an elevated road with no speed limit, solely for automobile traffic!

The subject needs much more discussion than it is getting. It cannot possibly be handled much longer by repressive legislation alone.

Austria-Hungary

By Edward Allen Langdon*

¶ All classes in Hungary have been enriched by the war, and when hostilities cease there will be a large demand for automobiles.

¶ Austria will need 150,000 passenger automobiles and 6000 trucks in the first 24 months following the close of the war.

¶ U. S. A. automobile firms will have to establish service stations in either Austria or Germany. They will have to be well stocked with spare parts.

¶ Hungary being primarily an agricultural country will need light automobiles and small farm tractors. Conditions are similar to that of the West and Middle West U. S. A.

¶ Austria-Hungary after the war will be on a basis of German efficiency.

So far as one can tell, by developments up to the present time, there will be hardly a country in Europe which will be so modernized by the war as Austria-Hungary. Already deep changes are noticeable, and no doubt this state will present, after the war, a set of conditions altogether different from what the dual monarchy was known as before 1914. Many of these changes are of very direct bearing on the question of Austria-Hungary as an automobile market, and the following remarks are devoted precisely to this question. If, after 2 years of warfare, the struggle is still going on unrelentingly, it seems nevertheless to most well-informed people not only in Central Europe, but also in the neutral countries of this continent that the end of the war is nearer than it would seem from its bitterness. For this reason, too much stress cannot be laid upon the advice to American manufacturers of automobiles, motor trucks, tires and accessories.

1500 People Per Car

The beginning of the war found Austria in the possession of perhaps 40,000 automobiles. Certainly, this was a small number for a nation of almost 60,000,000. But there was a reason, or rather, several good reasons; Austria-Hungary was, and still is, primarily an agricultural country, and in Europe this means a country none too progressive. Hence, modern machinery both in manufacture and transportation was introduced slowly. The horse played a very important rôle in the transportation of passengers and merchandise. The agricultural population, excepting the rich landowners, were partly not in a position to buy automobiles, and partly did they still mistrust this modern type of vehicle. The peasant in this country is much more conservative than the American farmer, or for that matter, the farming class of England and France. Hence, the rural sections were almost without motor vehicles, excepting where lumber mills and other large industrial undertakings utilized motor trucks.

Horses Are Fewer

All these conditions have changed. The supply of horses has been diminished, so that the importance of this factor in tractive work is much less than 3 years ago. In addition to this absolute decrease of importance, there must be considered the fact that the peasant class has more than any other class suffered from the troubles of war, is more than any other decimated and maimed and reduced in their ability to work. Hence, agriculture in the dual monarchy will *perforce* be put on a more modern basis of operation, wherein the work formerly done by two, three or four men will have to be done by one man, or a woman, for that matter; as women are now a factor of never before imagined importance in the life of Austria-Hungary.

So much for the need of small passenger automobiles, medium-sized trucks and tractors for the agricultural sections.

Government Provides Truck Subsidy

The industries of Austria began to take to automobiles even before the war, and this trend was enhanced by the policy of the government to subsidize purchasers of motor trucks made in Austria provided the trucks came up to certain governmental specifications so as to be useful in case of war. This policy will without a doubt be continued with increased energy when peace has been restored, and of course foreign-made automobiles (in all likelihood the subsidies will be extended to passenger cars also) will not receive the government support and therefore will have to compare favorably in price with the native product.

All the population has been educated in a broad way to modern appliances by the war. Soldiers, called from the farm, who never before had an opportunity to handle mechanical devices, have become interested and adept in the driving of automobiles. People have become accustomed, in this most comfortable country of Europe, to do their work on an

*EDITOR'S NOTE—Edward Allen Langdon has for many months been in different parts of Europe studying automobile conditions in those countries. Mr. Langdon is a critical student of conditions. He is making a conservative study of trade and all his utterances savor of conservatism.

efficient-schedule basis, to be on time, to carry out their tasks with almost German or American precision. All these factors make for a psychologically better automobile market after the war.

Hungary Especially Important

Special attention should be given to Hungary. This part of the dual monarchy has very much increased in importance during the war and indeed is to-day more powerful than "the Kingdoms and Countries represented in Parliament," as the Austrian half of the realm is called officially. Hungary is primarily an agricultural country and fertile enough to feed all of Central Europe, with proper methods of distribution. But the country is also rich in mineral resources, and the past two decades have seen a rapid growth of industry there. The war is bound to accelerate this development, and as Hungary has been very much enriched, through all its classes, by the war, it ought to offer splendid opportunities to enterprising exporters of American cars.

Money Is Plentiful

The field here includes especially the very types of automobiles sought and bought by American farmers of the West and Middle West, also three-wheeled tractors suitable for connection to agricultural machines proper. It should also be noted that the end of the war will find money more plentiful in Hungary than in Austria.

It has been stated that women have become a highly important factor in social and economic life of Austria-Hungary. This means that cars hereafter will in many cases be operated by women, whereas before the war none except the ladies of the richest classes operated machines. It follows that, women being perhaps less ready to grasp mechanical details, the bulk of automobiles sold in Austria-Hungary will have to be fairly simple and yet reliable in construction.

Much Hill Work

Austria is to a very large extent mountainous, and passenger cars for touring purposes will have to be of a type suitable for alpine work, with good climbing ability, plenty of reserve power and fair fuel economy. The Austrian fuel, after the war, will be benzine—practically identical with American gasoline—although Germany will use alcohol and benzol extensively. Touring cars should be comfortable, strong and efficient, without being too heavy. The ideal type of Alpine car is the Austrian Daimler which in the last few Alpine tours made excellent showings; and by this standard Austrian tourists will measure the cars they buy. They will look for machines built along somewhat similar yet lighter lines, including the points aforementioned, and fitted if possible with large tires, as well as electric lighting and starting, all the necessary accessories and fixtures required for the particular class of touring.

Service Stations Are Essential

One point essential in selling cars in Austria-Hungary is that there must be a service station somewhere in Europe, capable of supplying within a few days any reserve parts needed. Very likely this service station will have to be located in either Austria or Germany, as it will be a long time until the Central European countries will forget the isolation created by the British blockade. This point of the necessity of a service station cannot be overemphasized.

The Road to the Orient

Another point is the knowledge of the native language by the salesman, and, of course, discretion and politeness, perhaps even diplomacy; for there are many people in Central Europe now who are anything but enthusiastic admirers of America.

If, as has been mentioned as probable, the end of the war is nearer than is generally supposed, then Austria-Hungary will take on importance in another new respect. At this writing there is practically an unbroken line of transit between Hamburg and Bagdad; and unless the fates of war change fundamentally in the future, Vienna will be the central point of the important bridge between industrial Germany and the progressing Near East. Austria-Hungary is bound, in such an evolution, to play an important role, and preparations are being made, financially and technically to fit her for playing it. This development alone, the rendering of the dual monarchy into a road to the Orient will necessarily lead to an increased prosperity of Austria-Hungary.

Industrial Efficiency to Grow

Judging by the degree to which Austrian affairs are now run, directly or indirectly, by Imperial German direction, it is very likely that Austria will rapidly advance to an industrial efficiency closely approaching that of Germany herself. In that case the prosperity of the rejuvenated dual monarchy will by far exceed the fairly conservative estimate given below. This estimate is for the automobile market's capacity, for the 24 months following the war, and presupposes a moderate regeneration which would be illustrated by an exchange rate on Austria of 15 to 16 cents for the Krone. From talks with members of the Austrian industries I should put the demand for the period mentioned at

150,000	passenger cars....	@ $ 700	$105,000,000
5,000	trucks	" 2,000	10,000,000
1,000	"	" 3,000	3,000,000
	Total		$118,000,000

Best Car-Marketing Plan

The prices marked would have to be f.o.b. New York, and wherever agencies are given to local dealers, transactions would have to be done on letter of credit for 4 months' sight. Automobiles would have to be guaranteed substantially.

As to the selling of cars in Austria-Hungary a few points have already been mentioned. The most advantageous method of utilizing the territory would be a central place in Vienna, and four or five branch salesrooms in Austria and one or two in Hungary. Perhaps the best plan would be for several makers to combine for the export of their products to Austria-Hungary so as to reduce the expense and use the saving for selling the machines at the best price possible.

Regarding the cost of such agencies, it is very difficult to lay down definite data, but a place in Vienna and moderate advertising can be had for $12,000 to $15,000 a year total expense. This makes possible a turnover of $60,000 to $80,000 for the same period.

U. S. A. Cars in Favor

Before the war, half a dozen or so of well-known medium-priced American cars were introduced very successfully in Austria-Hungary and while the supply of these cars was cut short by the outbreak of the war, many of these machines have rendered splendid service in the army and have served to create an excellent reputation for American cars regarding which many pople felt rather chary prior to the present calamity.

There has been a tariff on automobiles and it will very likely be continued after the war, perhaps even increased. If this is the case, the exporting to Austria-Hungary of automobile parts will pay even better than that of complete automobiles.

Good Tire and Accessory Field

There is also a splendid market for tires in this country, and while there are some Austrian and German makes on the market, American products, if properly handled, should be

able to replace them completely after the close of hostilities.

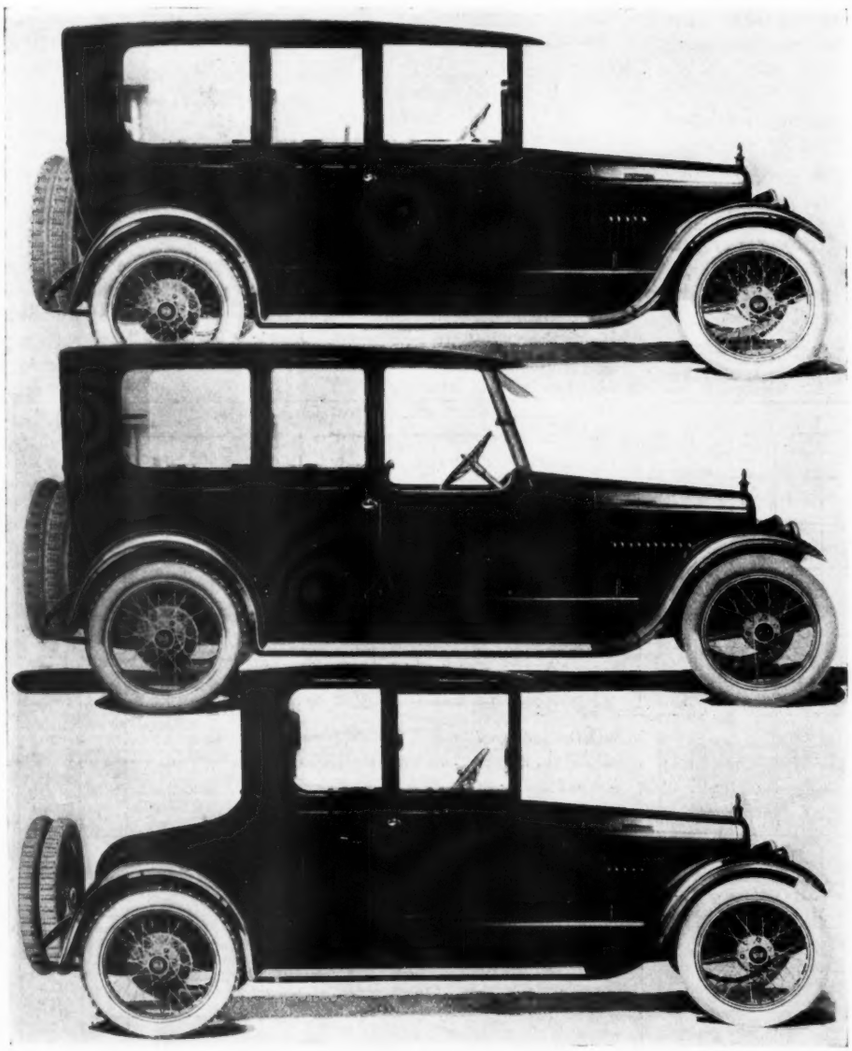
Likewise, accessories such as starters, speedometers, etc., are certain to find a good market in the dual monarchy after the war.

Must Begin Operations at Once

In every case where exporting is tried, the work can best be done by native Americans—except if an applicant for the position possesses unusually good connections in the country—who can speak the language fluently and who are possessed of some psychological instinct and natural tact. This point, however commonplace it may sound, is extremely important and can perhaps be fully appreciated only by those Americans who have spent the last 2½ years in Central Europe, during which time relations across the Atlantic became strained more than once. At the present time the feeling toward America is rather friendly, and, unless the situation is changed radically, will continue to be so to the end of and after the war.

At any rate, preparations for handling the Austro-Hungarian after-war business cannot be made too early. Not only because doing business in this country of many tongues and nations requires deft treatment, but also because Germany is certain to recover with great speed from the war. The German Empire, due to the preparations made for the days of peace even now, when supreme efforts are still being made for waging the war, will beyond a doubt be the first country of Europe to get over the effects of the war, and will do everything in its power to obtain a maximum share of the world's trade, and logically will begin with the places nearest home: Austria-Hungary, Scandinavia, Poland, Italy and the Near East. The export to all these territories, is therefore, really one great question, and will have to be handled as such. Unless American manufacturers realize this in time, they will lose the greatest chance of the after-war period; just as—according to many economists here—they have done themselves out of a good share of lasting international trade by devoting their energies chiefly to the destructive and very temporary business of supplying the European war.

Jordan Limousine, Luxury Sedan and Custom Style Coupé



Above is the new Jordan seven-passenger limousine which sells for $3,000 f.o.b. factory. It is mounted on the standard four-cylinder chassis with 127-in. wheelbase. There will be only twenty-five limousines provided. In the middle is the Luxury sedan which has a permanent top but is convertible so that it may be used open or closed for different seasons. It lists at $2,350 f.o.b. At the bottom is the four-passenger coupé which sells for $2,300

COMBINING selected materials with workmanship of a high standard, the closed line of the Jordan Motor Car Co., Cleveland, comprises a seven-passenger limousine, a seven-passenger sedan and a four-passenger coupé. All are of low design, in accordance with the latest dictates of body construction, and the spring suspension is adapted to each to meet all load and road conditions and are rigidly mounted on the chassis to eliminate all rattles and squeaks.

Only twenty-five limousines will be provided, insuring distinction to the purchasers. The color is an unusually attractive blue or green, upholstery in the rear compartment being French tapestry with the front seats in long-grained, hand-buffed leather. There are window lifts, silk curtains, auxiliary seats folding out of sight, dome, running-board and reading lights, etc., besides many small bits of equipment, such as a watch and dictagraph phone. The price is $3,000, f.o.b.

As in the limousine, comfort is a great feature of the Luxury sedan. This body is of the convertible, permanent-top style, with windows folding into the doors. A car heater is provided, and the equipment is complete to the smallest detail. The sedan lists at $2,350, f.o.b. factory.

The coupés will be limited in output and will be of the same general finish as the sedan, the seating arrangement, however, being staggered, two passengers sitting at the right about 16 in. to the rear of the driver. The rear compartment will hold two suitcases and a traveling bag. The coupé sells for $2,300.

All three bodies are mounted on the standard Jordan sixty chassis with 127-in. wheelbase.

Suggests a New Testing Method

Novel Way of Plotting Engine Characteristics Outlined in Paper Presented Before Mid-West Section S.A.E.

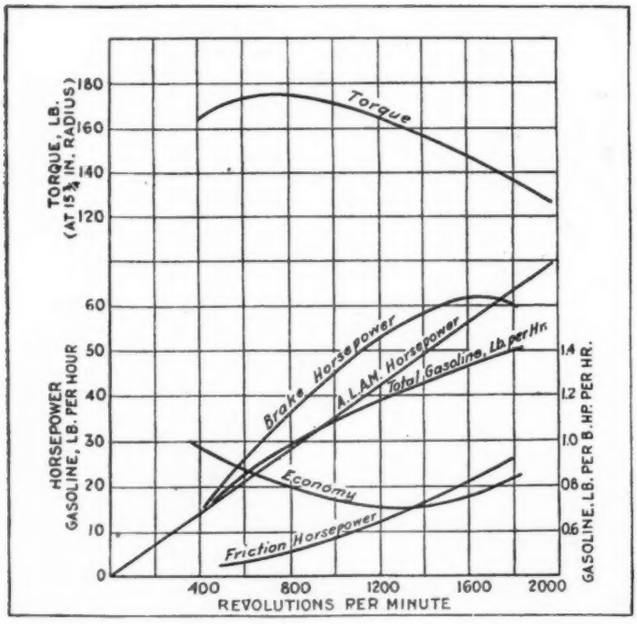
By Daniel Roesch

THE present method of testing variable-speed gas engines, as used in automobiles, motorcycles, marine craft or air craft, consists primarily of determining the *maximum* torque and horsepower at a number of different speeds. These results are plotted on co-ordinate paper; a smooth curve drawn through them represents the ultimate torque and horsepower characteristics for all speeds within the test range. The gasoline consumption is often taken simultaneously with these data. The gasoline consumption per hour or per brake horsepower per hour can then be plotted in the same way. These data are customarily taken under wide-open throttle conditions, the results being plotted with revolutions per minute as abscissas and the other variables as ordinates. These data and others less frequently taken during tests or derived from test results are:

1—Revolutions per minute of the engine.
2—Developed torque—average turning-moment developed.
3—Brake horsepower—calculated from 1 and 2.
4—Friction torque.
5—Friction horsepower.
6—Gasoline rate—preferably weight per unit of time.
7—Gasoline economy—weight per unit of power per unit of time, calculated from 6 and 3.
8—Jacket-water rate—preferably weight per unit of time.
9—Sensible heat in exhaust—by calorimeter.
10—Exhaust analysis—for incomplete combustion.
11—Radiation—preferably obtained by difference.
12—Air rate—weight per unit of time.
13—Mixture ratio—calculated from 6 and 12.
14—Depression in inlet manifold—indicating carbureter resistance.
15—Pressure in exhaust manifold—indicating exhaust-pipe resistance.
16—Spark advance.
17—Mean effective pressure, net—from 2, or 1 and 3.
18—Mean effective pressure, actual—from indicator card; from 1, from 3 and 5, or from 2 and 4.
19—Mechanical efficiency—from 2 and 4, from 3 and 5, or from 17 and 18.
20—Compression pressure—by indicator test.
21—Heat balance—percentage of heat supplied appearing as:

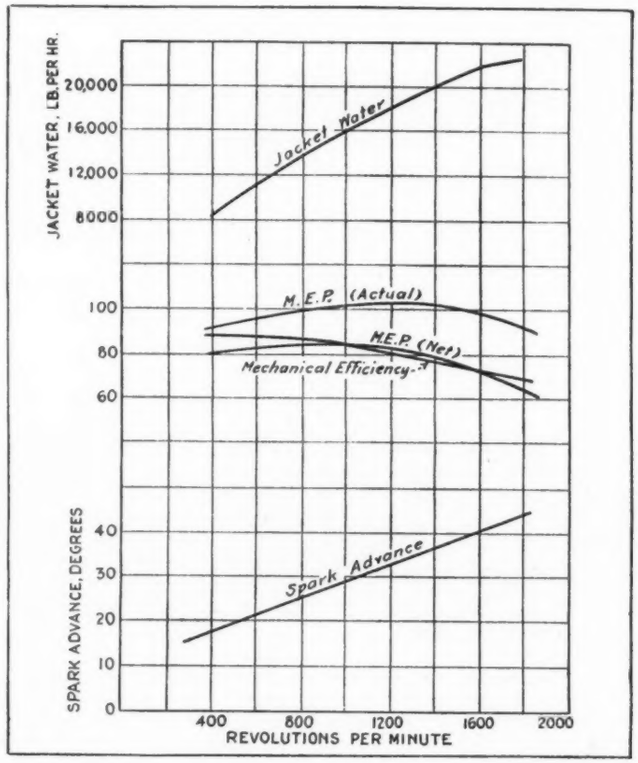
a Indicated horsepower.
  1. Brake horsepower.
  2. Friction horsepower.
b Jacket-water loss.
c Sensible heat of the exhaust.
d Incomplete combustion.
e Radiation.

These characteristics of a variable-speed engine show only its performance under wide-open throttle conditions—a condition often not maintained in use. It would follow then that an engine *A*, showing superior merits to an engine *B* under the usual test conditions, can have inferior



Above—Fig. 1—Torque, horsepower and fuel consumption curves

Right—Fig. 2—Curves for engine operating with wide open throttle



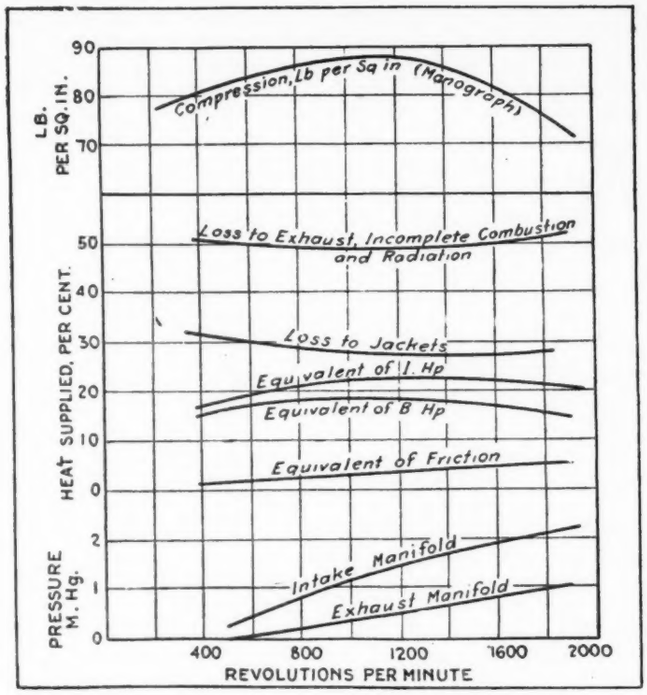


Fig. 3—Curves showing distribution of heat supplied to engine

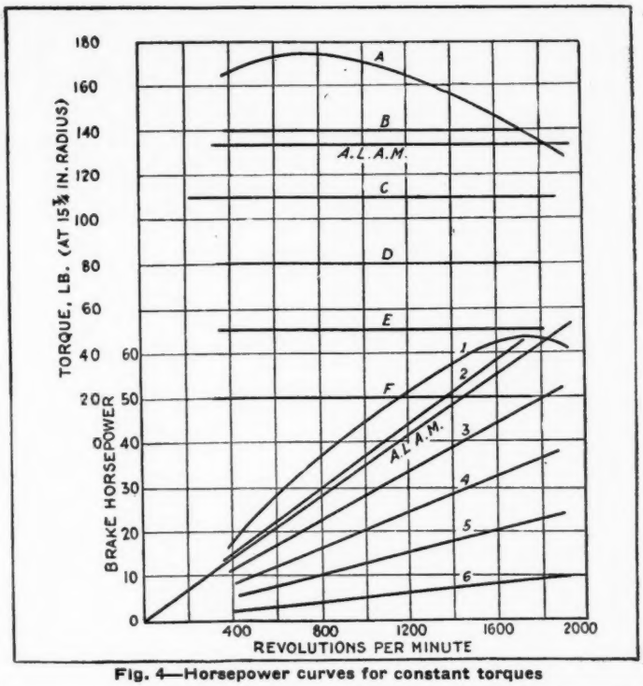


Fig. 4—Horsepower curves for constant torques

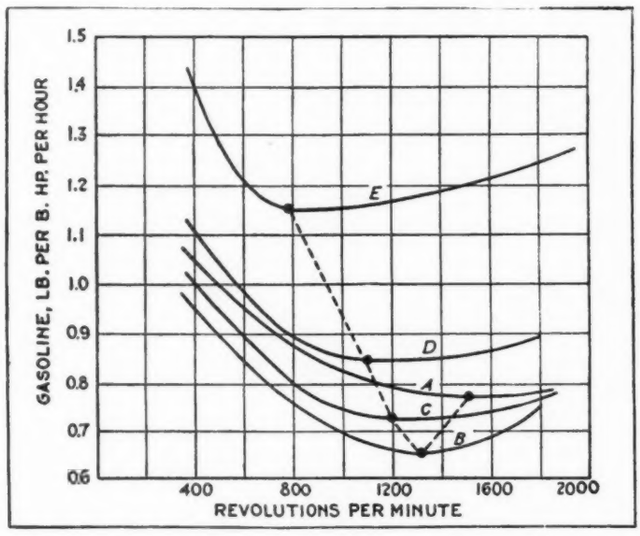


Fig. 6—Fuel consumption per brake hp. for constant torques

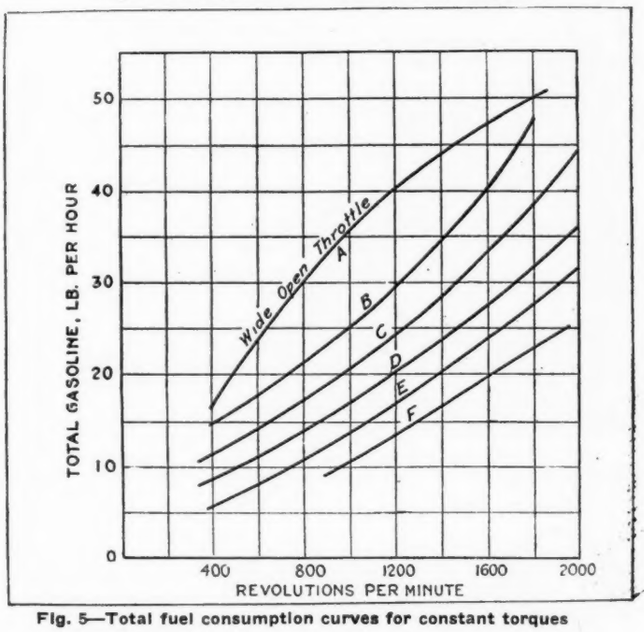


Fig. 5—Total fuel consumption curves for constant torques

merits when tested under partly-open throttle. This difference would have little moment where the engine operates largely at wide-open throttle, but might have a determining influence where the operation was chiefly at partly-open throttle, as in the automobile or motorcycle engine.

Preliminary Investigations

In order to investigate this question and develop a method of analysis for engines of this type the author suggested to Messrs. Cooban, Palmer and Stepanek, class of 1915, Armour Institute of Technology, that they conduct a preliminary investigation of this problem as a thesis. This investigation furnished the necessary data upon which the method was developed. Additional investigations utilizing and developing this method of testing are at present being conducted in the Armour Institute laboratories by Messrs. Fritze, King and White, class of 1917.

Electric-dynamometer tests were conducted on a high-class 4 by 5½-in. six-cylinder L-head engine built about June, 1914. The data were taken so as to cover all ranges of speed and load on the engine, whereas the customary method covers all ranges of speed at maximum load only. The engine was new, was fitted with stock pistons and had no extra provisions for lubrication. It was deemed therefore advisable not to operate at high speed or heavy loads more than 10 min. without decreasing the load. A run confined to this time limit gave accurate readings of power and economy with possibly questionable readings of jacket losses.

Since this paper deals with the method of obtaining new test data and not the actual figures obtainable, slight inaccuracies are of no particular consequence. The test data as replotted nevertheless represent performance characteristics in a new and broader way than heretofore observed. While the 1915 preliminary thesis established that such a method gave the desired information, it was considered more cumbersome than the one here described.

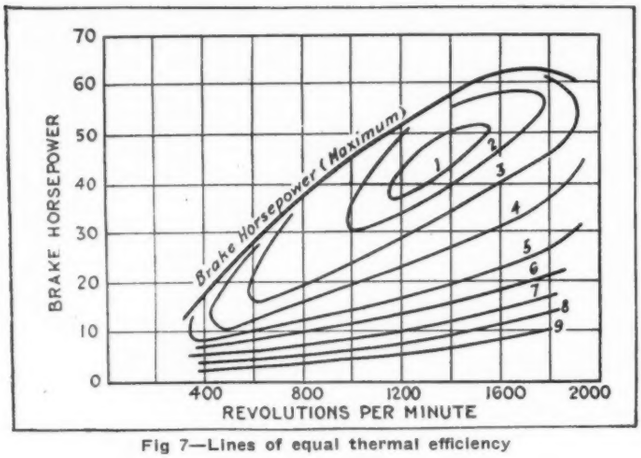


Fig 7—Lines of equal thermal efficiency

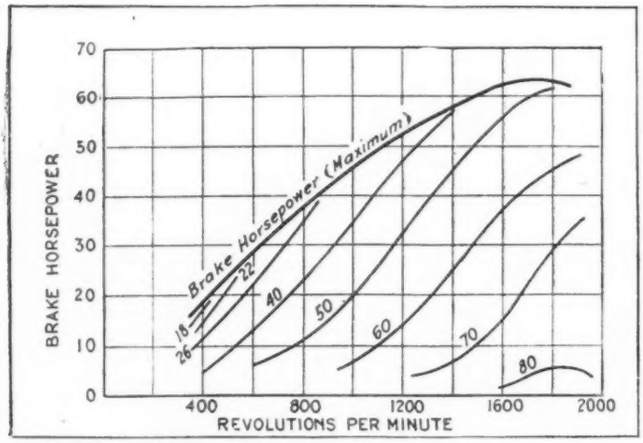


Fig. 8—Lines of equal spark advance

If data enumerated under items 1 to 21, inclusive, were taken during a test of an engine the resultant curves might be conventionally shown as in Figs. 1 to 3, inclusive. It is to be again noted, however, that only wide-open throttle conditions of operation are represented by these curves.

Methods of Complete Analysis

The complete analysis of an engine of the type considered can be determined from data taken in the following manner:

Tests are first made in the conventional way at various speeds with wide-open throttle. Whatever data are desired are then taken at each test speed and the customary characteristic curves plotted. One of these will be the torque curve, which is frequently taken as the pull in pounds at a 15¾-in. radius. This characteristic is represented by *A*, Fig. 4. The corresponding horsepower curve is represented by 1, Fig. 4, and shows the maximum power developed at any speed. If now a constant torque of, say, 140 lb. at 15¾-in. radius be maintained and the test conducted as before, we can obtain torque curve *B*, Fig. 4, and the corresponding horsepower curve 2. Similarly the curves *C*, *D*, *E* and *F*, and their respective horsepower curves 3, 4 5 and 6, are obtained for various constant values of torque.

Whenever the torque line is horizontal a constant mean effective-pressure, net, has been maintained by the engine; also the horsepower increases directly with the speed. This is similar to the N. A. A. M. horsepower rating and its corresponding mean effective-pressure, net. These lines are added to Fig. 4 for comparison. Since the horsepower of all but the first series of tests is proportional to the speed these curves will be straight lines and pass through the intersection of the axes.

Instead of selecting constant even-value torques for lines *B*, *C*, *D*, *E* and *F*, an alternative method would be to obtain these curves so that they would correspond to 67.3 lb. m.e.p., net, and, say, 15, 30, 45, 60, 75 and 90 lb. m.e.p., net. The advantage would be in subjecting various engines to like net mean effective pressures for each series of tests. This would facilitate comparison of performances. The disadvantage lies in having an odd value for the torque, which may be confusing during testing.

While this analysis can be applied to all of the data enumerated at the beginning of this paper, the factors of fuel consumption, mechanical efficiency and spark advance are probably the most important. The method of determining these and other characteristics under all conditions of load and speed will be indicated.

Obtaining Contour Lines

The total fuel-consumption curves for conditions as indicated, curves *A*, *B*, *C*, *D*, *E* and *F*, Fig. 4, are shown by curves similarly marked in Fig. 5. The gasoline consumption in pounds per brake horsepower per hour for each load condition was also computed and plotted in Fig. 6. These curves then furnish the necessary data to establish the load and speed for any particular gasoline consumption. A set of interpolation curves was then constructed for 400, 600, 800, 1000, 1200, 1400, 1600 and 1800 r.p.m. with brake horsepower as abscissas and gasoline consumption in pounds per brake horsepower per hour as ordinates. The data for these curves were taken from the curves in Fig. 6. These interpolation curves furnished sufficient points for, say, 0.7 lb. per brake horsepower per hour, to locate properly this contour line in Fig. 7. The other lines of equal thermal efficiency were plotted in a similar manner from the same in-

Line No.	1	2	3	4	5	6	7	8	9
Gasoline, lb. per B. Hp. per hour	0.66	0.7	0.8	0.9	1.0	1.25	1.5	2.0	2.5
Thermal efficiency on B. Hp.....	19.3	18.2	15.9	14.1	12.7	10.2	8.5	6.4	5.1

terpolation curves. Lines of equal gasoline consumption were thus established from these test data, as shown in Fig. 7. Lines of equal spark advance, Fig. 8, have been determined in a similar manner. Lines of equal mechanical efficiency, Fig. 9, have been determined by the conventional electric dynamometer method. There appears to be no reason why any of the other test data ever taken could not be graphically shown in a similar manner.

Summary

The chief advantage of the data presented graphically in the manner indicated is that they show concisely and clearly the performance of the engine under every possible condition of load and speed. Academically the method has already been found valuable in disclosing completely the various engine characteristics. Commercially the determination of cer-

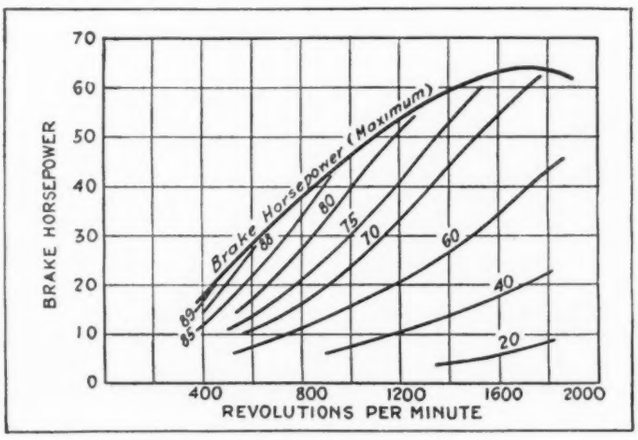


Fig. 9—Lines of equal mechanical efficiency

tain of the contour lines has been found valuable in design study of the engine features affecting them.

The gasoline-economy contour curves of various carbureters on the same engine should be of particular value for purposes of comparison. The same curves from different engines would be of value in more closely predicting car mileage per unit of fuel consumption.

The data on sensible heat in the exhaust should be of value in the design of kerosene carbureting devices, with which considerable heat is required for fuel and air preheating.

The jacket-water rate and loss should be of value in pump and radiator design.

The spark-advance contour curves are valuable in design of automatic spark-advance mechanisms, which advance correctly the spark for load and speed variations.

May Develop Other Methods

No doubt many other applications of test data recorded as indicated will become apparent upon study by the automobile-design specialist. It is hoped that the presentation of this paper will develop discussion showing: 1, The weak spots in the method and means of remedying them; 2, benefits to be derived from data thus presented; and, 3, other methods for ascertaining similar results.

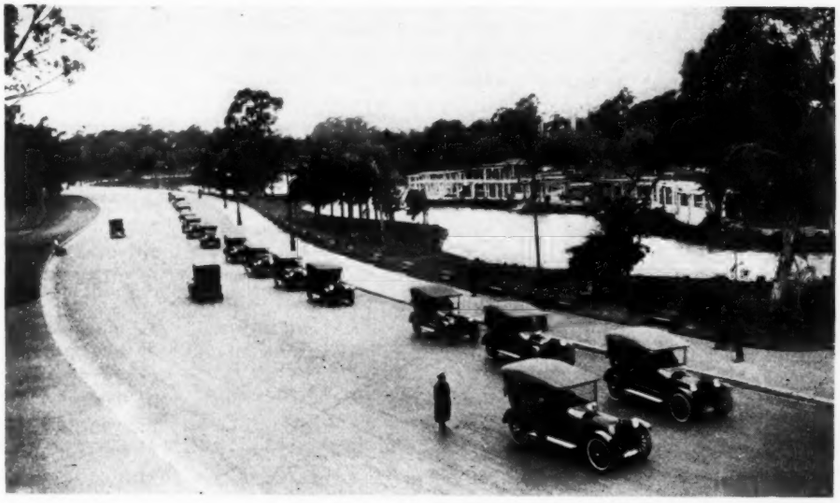
Studebaker Dealers and Sub-Dealers in South America Meet in Buenos Aires

BUENOS AIRES, ARGENTINA, Nov. 4—The annual meeting of Studebaker dealers and sub-dealers in South America was instituted in this city during the past fall, when D. B. Richardson, manager of the Studebaker interests in South America entertained all of the dealers and sub-dealers at a banquet as well as a trip through the city park system.

The meeting of dealers in a conference of this kind is unusual in Argentina. The city of Buenos Aires has not its association of automobile dealers as have the cities in North America. Here there has never been any getting together of dealers handling rival makes of cars. Since the war it would be practically impossible to get around the same banquet table dealers representing English, German, French and Italian cars. It is this fact that Buenos Aires dealers handle cars made by rival countries that has held back cooperation of Buenos Aires dealers. Unquestionably this movement by the Studebaker organization will have its influence, and manager Richardson has made up his mind to have started in this city an organization of automobile dealers such as exists in so many cities in the United States.

The illustration shows a typical Buenos Aires scene with the parade of Studebaker cars filling the street. It is a park drive in the Palermo Park, which is one of the show points of Buenos Aires.

The rapid increase in the number of U. S. A. cars exported to Argentina is an indication of the development which may be expected in the automobile business in this country.



A vista down one of the drives in the Palermo Park in Buenos Aires, showing the parade of Studebaker cars held at the time of the dealers' convention. Palermo Park is one of the show places of the city, noted for the beauty of its parks and boulevards

Studebaker dealers and sub-dealers in South America at the banquet held during their recent convention in Buenos Aires

Care of Batteries on Stored Cars

75% of Battery Troubles Are Due to Neglect of Dealers To See That Cars Are Turned Over to Buyers with Battery Fully Charged

EDITOR'S NOTE:—From a paper presented by H. S. Bentley, of the Willard Storage Battery Co. before the Indiana Automobile Service Managers' Assn. Dec. 9

BECAUSE of the failure of motor car dealers to give the storage battery a proper chance for its life, by neglecting to turn it over to a customer with a full charge, at least 75 per cent of all future storage battery troubles and dissatisfaction are born. If he knows the battery is half or more discharged, he quiets his conscience by thinking that the generator will build it up to a condition of full charge. This may happen in a few cases, but in most cases the current produced by the generator will not be sufficient to any more than replace the current used for everyday lighting and cranking. Consequently, the battery continues in a more or less starved condition for several weeks or months, and ultimately goes dead. Reforming may restore it to serviceable condition, or new insulation may be necessary. In either case the owner expresses dissatisfaction with the battery, which dissatisfaction, if properly placed, should be directed toward the dealer who neglected to furnish a new car with a battery in proper condition for service.

Half-Starved Batteries Cause Trouble

Battery trouble develops in other directions from half starved batteries on new cars. If the battery and car have been in transit or in stock for a considerable period, the discharged condition of the plates may make them so hard that great resistance to the charging current is set up and the plates are severely overheated on the first long run on a warm day. The normal generator output which would not injuriously affect a healthy battery will produce this result in a neglected and discharged battery.

We have already shown that it is always of very great importance to the life and service obtained from a battery, that the dealer should have it charged upon receipt, if necessary, and thereafter keep it in a fully charged or nearly fully charged condition until the car is sold. Naturally, this is of much greater importance with respect to batteries received on stock cars to be held during winter months. This is true, because the storage period is ordinarily much longer than the period during which any cars are kept in stock during the selling season.

We come then to the question of the means which a dealer should take to preserve these batteries from deterioration, so far as possible.

Ship Dry Batteries for Winter Stock

First of all, manufacturers should arrange with their dealers to ship them "export" or "dry" batteries with all cars to be stocked during the winter season. These batteries are prepared without electrolyte, and if kept in a moderate temperature of from 35 to 60 degrees will need no further attention, and will not suffer deterioration to any degree until they are needed for service. A few days before they are to be used for service they must be filled with electrolyte of the proper strength and given a reforming charge until gravity and cadmium tests show that the plates are in a fully charged condition.

Must Take Precautions

Manufacturers who ship batteries for winter storage in the dry condition should take the precaution to paste a seal over the filling aperture of the gasoline tank, calling attention to the fact that the battery on the car is without electrolyte, and must be properly filled and charged before the car is used. If this precaution is not taken, it would be possible, through carelessness, for batteries to be charged while dry, and consequently ruined. If batteries are received in the regular way with electrolyte, they should be fully charged upon receipt, and given sufficient charging every 2 weeks thereafter to keep them in a fully charged condition. Due to the chemical action, there will be more deterioration during the storage period than would be the case if they were prepared and stored in the dry or export condition.

Shipping Cars Without Batteries

It has been proposed as a possibility that manufacturers ship cars for winter storage without batteries, and some provision be made for supply batteries in proper condition for service when the cars are sold in the spring. It is manifestly impossible for a storage battery manufacturer to undertake to make deliveries on manufacturers' orders through their retail selling organization. The difficulties of making proper shipment to proper points, and of handling the billing and other details would make such a plan prohibitive.

Value of Service Stations

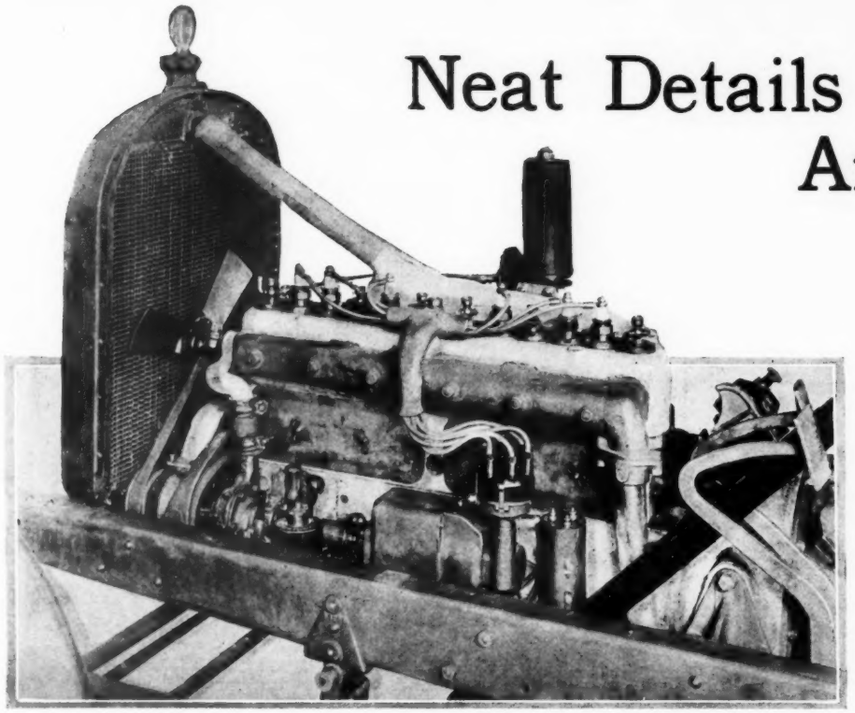
It must be recognized, however, that the dealer seldom has the equipment or skilled employees necessary either to prepare dry batteries for service, or to properly care for wet batteries economically. Careless or inexpert garage employees already have to their discredit the absolute ruin of hundreds of batteries, either through overcharging or charging in reverse. So far as the Willard company and Willard batteries are concerned, competent battery service stations have been provided at over 800 points in the United States and Canada, in whose hands either wet or dry batteries may be placed for storage and preparation with absolute confidence. Dealers may, therefore, unload on the Willard service organization all worries and cares in connection with batteries received with winter stock cars. The cost of this service will be reasonable in every case, but will necessarily be governed to some extent by local conditions in the various territories. For example, a service station at Buffalo may pay only 1½ cents per kw. for electric current, 4 cents per lb. for electrolyte, and 30 cents per hr. for labor. At Butte, Montana, electric current may cost 12 cents per kw., electrolyte 10 cents per lb., and union labor may be at the rate of 75 cents per hr.

Make Dealers Responsible

Considering the conditions as outlined, we believe that the best interests of the motor car manufacturer, storage battery manufacturer, motor car dealer, and ultimate car owner, demand that every motor car manufacturer put up to his dealers their responsibility for the condition of these batteries and recommend in the strongest possible way that the dealer place all such batteries as soon as received in the hands of the local service station of the storage battery manufacturer.

Neat Details Features of American Six

New Design by Louis Chevrolet—Full of Character—Lubrication by Unusual System



Mounting of Carter tank and Gray and Davis starting motor on American Six engine. Note the bracket on the bell housing carrying the accelerator pedal and starter switch

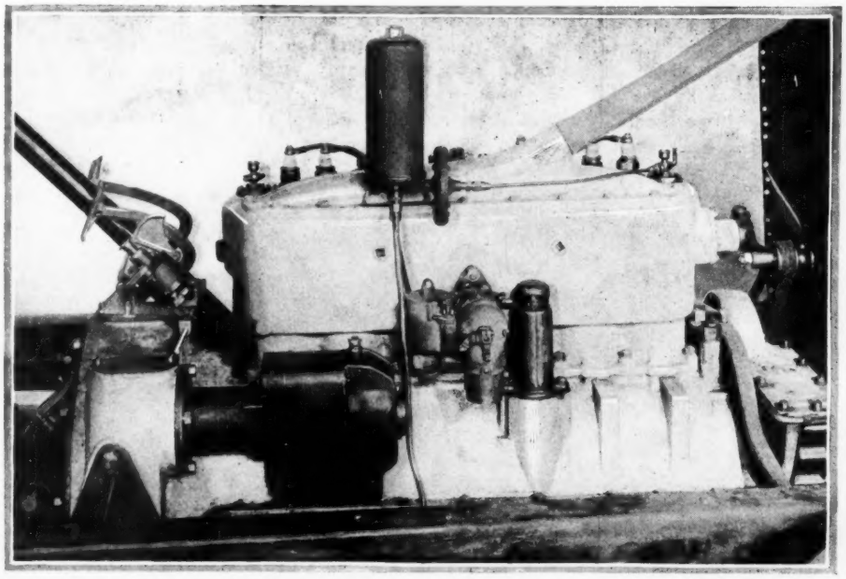
THE American Six, made by the American Motors Corp., Plainfield, N. J., while in no respect unconventional in a general way has many points which make it a distinctive car. With the exception of engine and frame it is assembled from well known units, but the detail has been worked out with great care, the engineer's particular aim being to produce a car which will have no petty weakness. After completing the design and preparing for manufacture the price has been set at $1,285 with five-passenger body, this being a little more than the original idea but necessary to maintain the standard of quality.

An almost unique feature of the American Six is that the chassis is complete in itself and is drivable without the body, all wiring and everything except the actual instrument panel being a chassis attachment. In the illustrations it can be seen that there is a light steel frame bolted to the top of the bell housing. This holds the accelerator pedal and the starting switch and also has a clip incorporated which takes the unit assembly of all the wires that have to go to the cowlboard. All the instruments are mounted on a plate that sets in the center of the cowlboard, so that there is only the atachment of this to be performed after the body is put on the chassis. On a chain assembly line this is an immense advantage, for it means that there are no awkward, half concealed things to get at. In connection with the panel assembly for the instruments there is a novelty which should appeal to the owner, this being the location of the single main fuse directly beneath the panel light and on the front of the panel. This makes the replacement of a blown fuse ideally simple and also allows the fuse to be used as a plug switch; since removing it prevents flow of current in any circuit.

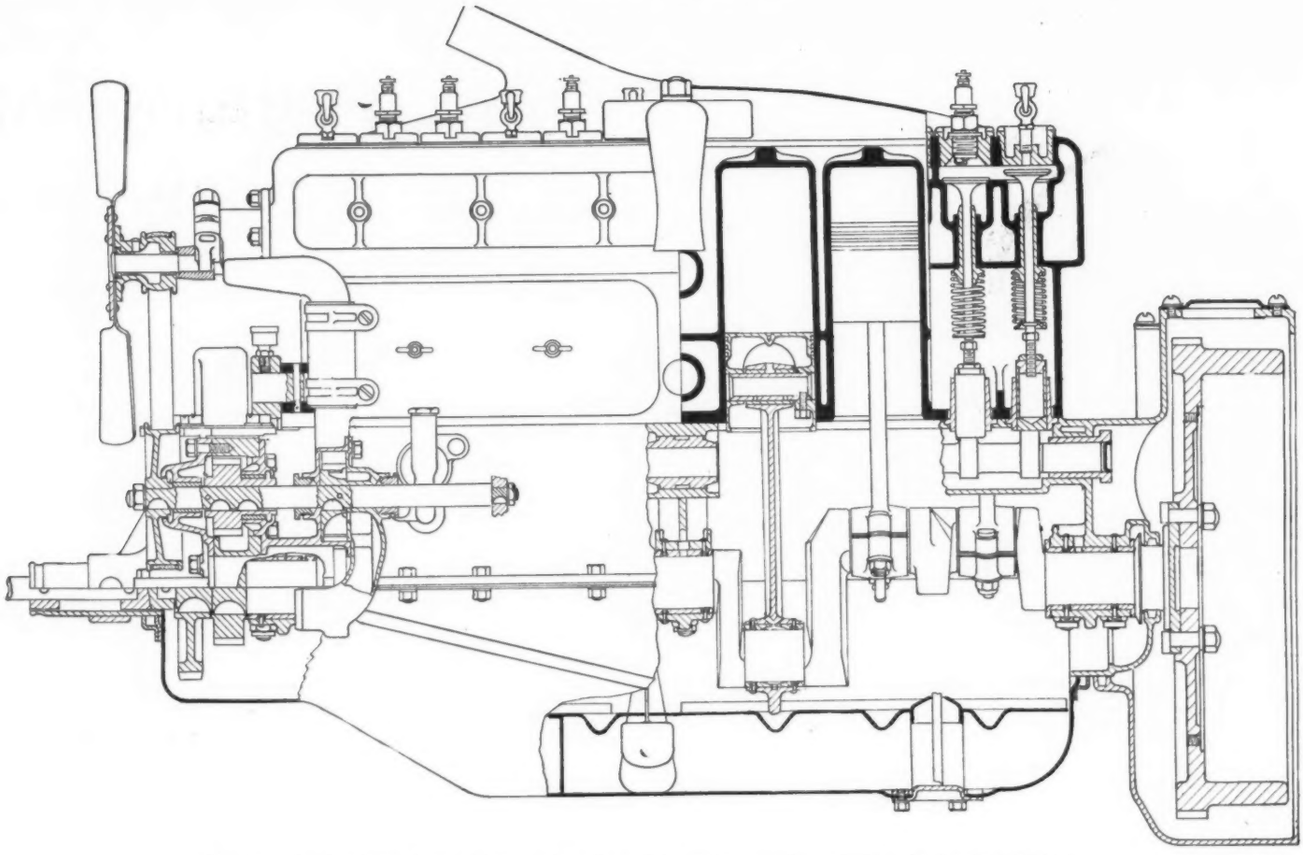
Engine Is Own Design

The 3 by 5-in. six-cylinder engine is not a stock article, but is made specially in a plant associated with the American Motors Co. Broadly it is of conventional design, but it has several points of novelty. The cylinders are an L-head block without a detachable head, the crankcase being aluminum throughout. To obtain quietness the camshaft lubrication has been studied and the shaft is inclosed in a tunnel to which oil is fed by a gear pump. This keeps the tunnel so nearly full that the tappets dip in the oil and the cams are entirely submerged. From this tunnel the overflow fills dip troughs beneath the connecting-rods and the oil splashed thence collects in deep gutters cast on the webs of the crankcase that conduct the lubricant to the three main bearings.

In the sectional view of the engine a neat point that should be noticed is the attachment of the water pump. As this delivers to the front end of the cylinders the outlet pipe has been ingeniously combined with the fan support, making a slight saving in weight by the combined functions. The at-



Generator and ignition unit with coil alongside mounted so as not to interfere with valve accessibility



Section of American Six engine. Observe ample water spaces round valves and cylinders

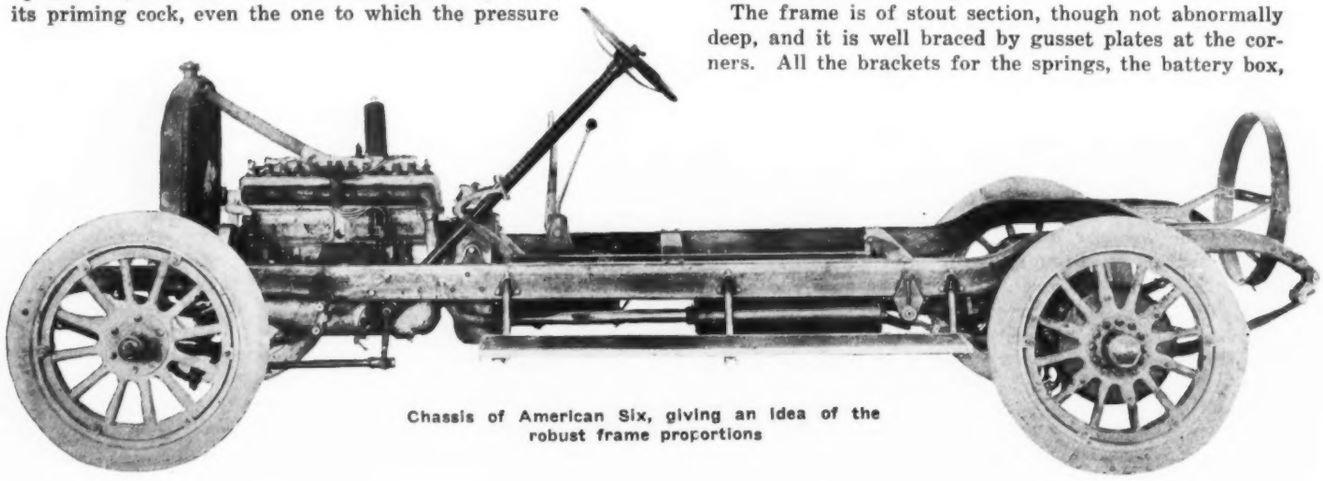
tachment of the pump to the crankcase so as to insure alignment can also be seen in the drawing.

Light cast iron pistons are used and the crankshaft is 1¾ in. diameter with webs big enough to reduce the tendency to distortion to vanishing point at all usual speeds. Care is to be observed in the layout of the electrical accessories, which are all of Gray & Davis manufacture. With the generator the closed circuit ignition distributer is combined, and the coil is mounted alongside the generator on the same crankcase platform. The starting motor is on the upper side of the crankcase, where it is out of reach of the worst of mud and water, and both generator and motor are perfectly accessible. In all, the tappets, electrical units and the pump gland are just about as accessible as they well could be, while the Zenith carbureter bolting directly to the cylinders is high up and easy to reach. Each exhaust valve cap bears its priming cock, even the one to which the pressure line for the Carter fuel feed is attached, and the Carter tank is clipped to the cylinders where it requires the minimum length of pressure piping.

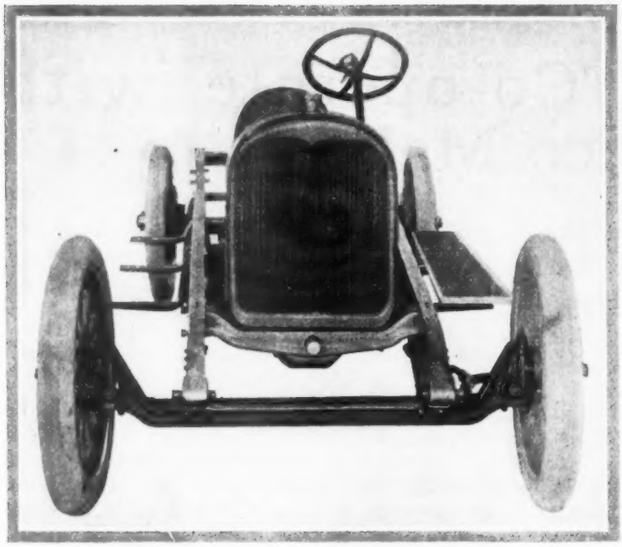
Strong, Simple Frame.

A three-speed Mechanics Machine Co. transmission is attached by a bell housing to the engine, and the clutch used is a Borg and Beck dry disk. In the housing are the necessary cover plates for giving access to the clutch adjustment. These are made more than usually easy to get at because the toe board has nothing fixed in it, the bracket mounting for the starting switch and accelerator allowing the toe board to come away without trouble. The clutch has a very light pedal action and the gear lever is set in a convenient position, so that gear shifting is easy even for a woman possessed of little physical strength.

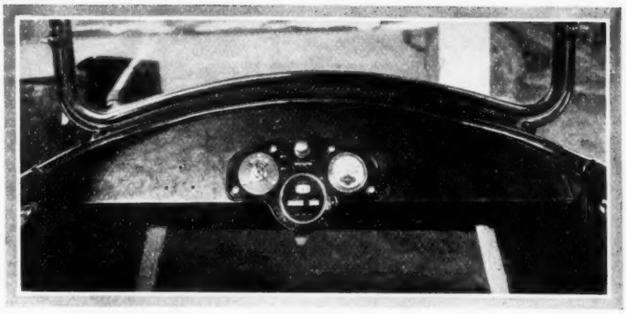
The frame is of stout section, though not abnormally deep, and it is well braced by gusset plates at the corners. All the brackets for the springs, the battery box,



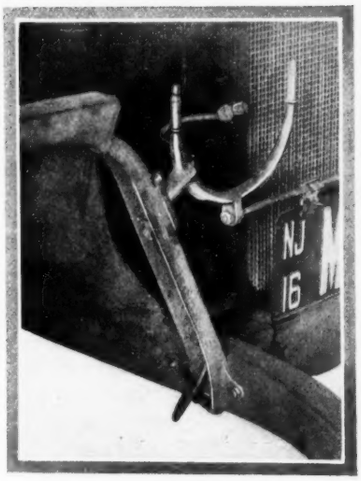
Chassis of American Six, giving an idea of the robust frame proportions



Distinctive radiator of American Six. A mudguard extension is fitted beneath the radiator, though not shown here



Above — Instrument board with unit assembly of all switches and gages in a central panel



Right—Lamp bracket and fender support, showing method of wiring for headlamps

etc., are massive, the idea being to provide a frame which will retain its original rigidity. The springs are all semi-elliptic, the rear ones being underslung, and Hotchkiss drive is employed.

Salisbury Rear Axle Used

A Salisbury rear axle is used with a gear ratio of 4 5/12 to 1, and the brake equalizers are mounted directly upon the axle housing. This allows a single rod to be run from the hand lever to the axle, and the pedal has one rod going to a short lever attached to a pivot on the middle cross member of the frame, a second rod going from the same lever to the rear axle equalizer bar. The intermediate lever brings the center of oscillation of the brake system near to that of the axle due to the Hotchkiss drive. The wheelbase is 122 in., and the tires 32 by 4 in.

Lavigne Steering Gear

For the steering gear a Lavigne has been chosen, this being a type with an easy action and provision for adjustment to take up slack. The front axle, which is a conventional forging, is set with a 5-deg. rake so as to provide a caster action, giving just enough natural return to the straight position of the wheels after making a turn to provide a "feel".

Only a five-passenger body will be made, at least at first, and the long wheelbase allows this to have plenty of room especially in front, the driver's compartment being well above the average standard of comfort. A narrow center cowl is used, this having polished wood at the back giving a nice finish to the tonneau. Leather upholstery is included and the color is a dark blue. In attaching the fenders rigidity is the feature most sought and the lamp brackets are utilized to assist this. A matter of detail is again apparent here, for the wires to the headlamps are taken up inside the mudguard, of course inclosed metallically, and led through beside the bracket, this reducing the length of the wire which is exposed to a minimum.

Olympian Car To Replace Pontiac Chassis

Olympian clover-leaf model mounted on the standard four-cylinder chassis to be manufactured by the Olympian Motors Co., Pontiac, Mich. This concern recently took over the Pontiac chassis. The new cars are going through production and test models are on the road

THE Olympian Motors Co., Pontiac, Mich., which recently took over the Pontiac chassis, will discontinue the manufacture of the latter after existing contracts have been filled. The new car which the Olympian company is manufacturing will soon be going through regular production and the trial cars are now on the road.

The chassis is very much the same as the Pontiac chassis except that it is 2 in. longer in wheelbase. The body is an original design and the complete car will be shown at the Sherman House in Chicago during show week. The car has a Golden, Belknap & Swartz unit power-plant with block 3¾ by 4¼-in. engine. Starting and lighting are by the Auto-Lite system.

Car Builders Can Co-operate with Electric Device Makers

Increasing Demands on Generator Make More Room in Mounting Necessary—Best Speed Ratio Should Be Determined—Co-operation on Battery Ignition Possible—Engineering Facilities Little Used

EDITOR'S NOTE—*From a paper presented by J. B. Replogle, director of research of the Remy Electric Co. before the Cleveland section of the S. A. E. on Friday, Dec. 15.*

THERE was a time in the history of the automobile art when the entire electrical equipment of a car consisted of a magneto to ignite the fuel in the cylinders and a pocket flash lamp to observe the fuel in the tank. As a conventional magneto gives two impulses per revolution, it was found necessary to drive the magneto shaft at engine speed, if the engine was a four-cylinder one, and at one and a half times engine speed if the engine had six cylinders.

Later it was observed that it was exceedingly difficult and inconvenient to light a lamp with a match in the rain and wind and that it was a laborious and sometimes dangerous task to crank a motor, so electric lights and cranking motors were installed, the source of the electric energy for these being a storage battery and a generator to keep the storage battery charged.

Later still, when it was learned how easy it is to transform electricity from one form to another, many men came to the conclusion that one generator of electricity on a car is sufficient, and in such cases, battery ignition displaced the magneto, and the generator was driven from the shaft that formerly drove the magneto and at one time it was an almost universal practice to drive generators on four-cylinder engines at engine speed and on six-cylinder engines at one and a half times engine speed. Of cars that we have listed, nearly 65 per cent are designed with the generator running either at engine speed or one and one-half times that speed. In many cases, no doubt, this is a very good ratio, particularly the one and one-half ratio, but it seems to indicate to me that the automobile designer has not given very much thought to the question of what is the best ratio.

Determining Best Speed Ratio

So the first way in which the automobile manufacturer can co-operate with the electrical accessories manufacturer is a careful consideration of the best speed ratio of generator to engine. The best speed ratio is a matter of gearing. It is the highest ratio that will permit of quiet gear operation and sufficient clearance space for the generator.

A very much larger proportion of the operation of machines is below 15 m.p.h. than formerly. This is largely due to the congestion of the streets and roadways. Touring around our large cities on a clear Sunday or other holiday has almost evolved into a slow parade. The cement and brick roadways are rather narrow and do not permit safe driving with more than two machines abreast and, as the parade is a double one, passing in both directions, it is usually quite hazardous to attempt to pass the machine in front. As a consequence, each line of the parade moves at a speed controlled by the wish of its most leisurely driver. Not only from this cause, but also from the number of children, motor trucks and day-dreaming pedestrians on the streets, a very large percentage of machines are being driven at low speeds a large proportion of the time. Notwithstanding this, the driver feels he has a real grievance if his battery is not kept charged.

It is a fact well known to electrical designers, and also to engine designers, that size can be traded for speed, and there is no doubt that generators can be and often are made large enough to supply the necessary charge to the battery even under these adverse conditions, but that adds weight and expense and is undesirable.

Should Avoid Causing Noise

But in the attempt to secure a high ratio, there are several limiting features of gear design that must not be overlooked. In the desire to run the generator at a high speed relative to the engine, many designers have made the mistake of having the gearing so designed that there are insufficient teeth in the pinion on the generator shaft to permit smooth and noiseless operation and a disagreeable howl has resulted at speeds where the generator is carrying its maximum load.

I cannot emphasize too strongly here the need of first-class gear making when high generator ratios are used as the presence of the teeth in the generator armature causes the load on the gears to vary harmonically and an unpleasantly loud sound will result unless the gears fit and mesh nicely.

A further difficulty occasionally met with in designing for high ratios is that the generator drive pinion is of such small diameter that insufficient clearance between generator shaft and crank case results and a more or less freaky type of machine must be designed to fit in.

While the application of electrical apparatus to automobiles is comparatively new, it must not be overlooked that the electrical art of itself is relatively mature and standardization has been carried much further than in the automobile art. During the period of its evolution very many forms of generators were developed, tried out and abandoned until to all intents and purposes but one form remains, namely the round or cylindrical type. You are using generators and motors in large quantities in your several plants and you will find that almost without exception they approximate the cylindrical form. This accumulated experience of an older art, when applied with common sense and judgment is of more value than any possible amount of theorizing on the subject, and the round type generator stands to-day the result of all the electrical brains that have made up electrical history. Therefore when you are designing your engine you can co-operate with the electrical accessories manufacturer by keeping in mind the desirability of applying standard generator frames and by adopting as high a generator gear ratio as you can without sacrificing smooth, quiet operation or necessitating the adoption of other than standard forms of machines. I might note here that to date, this highest gear ratio has not usually exceeded two to one.

Space for the Generator

That brings us naturally to the second item where the automobile manufacturer can co-operate, namely in designing so as to permit comfortable space for the generator. This statement will immediately provoke a reply that there is not

comfortable space in an automobile for anything except the passengers—but, notwithstanding this fact, I hope to show you where it will be to your advantage to allot a larger space for the generator.

As noted previously, the use of electricity was limited at first to igniting the charge in the cylinders. Next it was used for lighting the roadway and the tail lights. Then to illuminate the instruments on the cowlboard. In a limousine it is used to show forth the splendor of milady on her procession to the opera. It is used to crank the motor and blow the horn. It is used further to warm your fingers in the steering wheel. To heat the rechristened kerosene in the carbureter. To shift the gears and to play a fan on our overheated countenances. It can be used to apply the brakes and inflate the tires. In addition to all of this, the market offers quite a number of devices that purport to permit operation of the headlights at full brilliancy without conflict with the authorities or danger to other people and that takes more electricity.

Then we have the ubiquitous dirigible searchlight which also takes more electricity and all of this must be supplied by the generator. The first thing you know you will be overwhelmed with complaints that the electrical systems are not working right; the lights are dim; the starting motor will not crank the engine as it should; the batteries will sulphate and a host of other troubles will follow because you are using electricity faster than you are generating it. The space you allotted for the generator was sufficient when it only had to supply current for the starting motor during the summer months when the engine is not stiff and when the lights were few in number and operated but a short time in the later summer evenings. But with all of the accessories we now have demanding their share of current and with cars operated the year around and standing for hours at the curb with the lights burning during the long winter evenings, to satisfy the police authorities (although in a brilliantly illuminated space where you cannot avoid seeing them without shutting your eyes), then cranking a cold, stiff motor, the space allotted for the generator is insufficient. Several companies have developed a profitable business supplying extra equipment to garages for recharging batteries because the generators on the cars have insufficient capacity. In my estimation the time has come when you must be more liberal with the space allotted for generator and must demand and be willing to pay for a larger generator for the car or you will soon be swamped with complaints. That is the second item where you can co-operate with the electrical accessories manufacturer.

Difference Between Seasonal Demands

It might be advisable, before abandoning this phase of the subject, to note that the extreme difference between the electrical demand in mid-summer and in mid-winter has presented quite a problem to the electrical accessories manufacturer, owing to the peculiarities of a storage battery. In hot weather a storage battery of given rating can only receive a limited amount of current input without distress, due to rapid evaporation of the electrolyte and heating and buckling of the plates, and shedding of active material therefrom. But providentially, the electrical demand adapts itself to temperature conditions in such a way as to co-ordinate with the limitations of the battery, provided the generator output is made to co-ordinate with the electrical demand. That is to say, a battery cannot stand a large charge rate in warm weather for a long period, but it does not need a large charge rate in warm weather because the demand in warm weather is relatively low. But in cold weather the battery can stand for a much greater charge rate, the demand is much greater, and therefore the generator can and should be designed to give a greater average charge rate in cold weather than in warm. Heretofore this has been accomplished occasionally by hand-operated adjustment of the generator, but the company with which I am associated has evolved and is now commercially producing generators which automatically accomplish this by means of thermostatic control.

Need Substantial Starting Motor

There is opportunity for co-operation with regard to the starting motor also, although the situation there is not so acute as with the generator. The principal items are to have a very low resistance connection between the battery and the starting motor and to be willing to pay for a good husky motor. Let us consider each of these items briefly. Under the most favorable circumstances only about half of the energy used in breaking away a stiff engine ever gets to the starting motor. The remainder is lost in the battery, leads, connections and switches. Therefore, it is very important that you keep these low, either by placing the battery close to the motor or by using large cable to make the connections. Also to be sure that the kind of switches you use and the connections you apply are of high conductivity.

As regards the size of starting motor, here again the widespread use of cars throughout the winter has altered the situation markedly. The factor of safety of starting motors is just barely sufficient, in many cases, to take care of stiff, newly adjusted engines which have stood all night in a cold garage, and I believe a small additional amount spent for more power in the motor, and more ability to spin it when cold could well be withdrawn from selling expense because of the user's satisfaction in his equipment.

There are two kinds of strong motors, wastefully strong and efficiently strong. The torque of a motor is due to current, copper and steel. If you do not care how much current you use to crank the engine, you can economize on copper and steel, but if you want a thoroughly satisfactory equipment it must be an efficient one and that requires copper and steel and sufficient space in which to mount it.

Co-operation on Battery Ignition

In the consideration of co-operation of the automobile manufacturer with the electrical manufacturer in the matter of ignition, I will confine my comments to battery ignition, as that forms such a large proportion of ignition in this country. There are four prominent operating principles in battery ignition, namely, maximum speed at which ignition sparks will be supplied, minimum voltage at which ignition can be accomplshed, amount of current required at average driving speeds, and the energy contained in the spark for ignition. An ideal ignition system would be one that could fire an engine at 10,000 r.p.m. would operate perfectly with 1 volt, would require but a tenth of an ampere at 12 m.p.h. and would have so much heat in the spark you would not require any gasoline.

We cannot make such an ideal system, and you wouldn't buy it if we could because of prohibitive cost, but you sometimes ask for a system that comes unnecessarily near this ideal in some one characteristic and I am going to try and show you how you cannot eat your ignition cake and have it, too. To do this, I shall be compelled to discuss some elementary ignition principles and, if I repeat some things you already know, you will please bear with me, as I may hereby bring out a mite of information that is new to you.

A spark ignites the compressed charge because of its heat. This heat results from the dissipation of energy. This energy we get from breaking down the magnetism in a bundle of iron surrounded by two coils of wire. We build up the magnetism by sending electrical energy into the coarse primary winding and we carry a part of the energy to the spark by means of the secondary winding when we break down the magnetism. Now the electrical energy we send into the primary winding is in two parts. One part merely heats the coil and is wasted. The other part is stored in the coil in

the form of magnetic kinetic energy and this is the part we use to ignite our charge. The volume of this useful part depends upon two things, the current we send into the primary and the inductance which is a peculiar property of every electro-magnetic circuit. I am not going to take the time to try to show you what the inductance is, although it is probably the one most important characteristic of a coil, but I am merely going to tell you that this inductance has two effects that are of interest to us.

As noted before, it is absolutely essential that it be present to permit the storing of useful energy in the coil, and on the other hand, it tends to reduce the speed at which useful energy can be stored in the coil. So you see if we want a very high speed coil, we cannot have very much inductance. If we do not have much inductance, we must use a very large amount of current at running speeds or we will not have a desirably hot spark, and we cannot get sufficient current at very low voltages to produce an operating spark.

Speed and Power Requirements

If a customer asks us for a system that will fire his engine at 5000 r.p.m. we can easily give it to him, provided he does not object to using several amperes at running speeds and will guarantee his battery will never be below 4 volts. But if his engine will never run faster than 2000 r.p.m. he is buying something that is unnecessarily expensive for his needs, not necessarily more expensive in money, but in current consumption or satisfactory starting in cold weather with low battery. If your ultimate customer will never want to drive his machine so his engine is turning over at a greater speed than 2000 r.p.m. do not insist that we furnish you with ignition equipment that will show a bench test of 3500 r.p.m. because it will be necessary to sacrifice either current economy or heat of spark or low voltage operation to do so, one is practically as easy and inexpensive to make as the other, but you cannot have both without abrogation of the laws of nature.

So you can co-operate with the electrical accessories manufacturer by asking for what you need to use in the way of speed and not for what you want to show on a bench. Special equipment for stunt tests can be supplied without interfering with the efficiency of the general production.

Finally, you can co-operate with the electrical accessories manufacturer by making more use of his training and equipment. The accessories manufacturer is of the opinion that you cannot possibly know as much about the electrical equipment of an automobile as he, or are you nearly as well prepared to carry on experiments concerning the electrical equipment. He believes the time has come when it is decidedly expedient if not necessary for you to enter more freely into conference and discussion with him and to bring your electrical problems to him spontaneously so that he can render you real service in doing investigation and development work that he is best qualified to perform. He has complete and well organized laboratories and engineering staffs at your disposal that you are not making most efficient use of. He wants you to consider them your property, organized for the express purpose of giving you service at the time when it will do you the most good, namely in the period of design.

He is making an earnest effort to comprehend your problems and to formulate a solution for them. He has bought your cars and is driving them under all imaginable conditions in the endeavor to foresee future problems the solution of which will be of incalculable benefit to you. You and he are both trying to peer into the dim and misty obscurity of future trend of the art and he feels that if you and he travel together, he may often aid you in keeping to the road and occasionally your private road map may point out a way for him when no way is visible. Let us get together.

Reducing Waste Labor By Showing Results

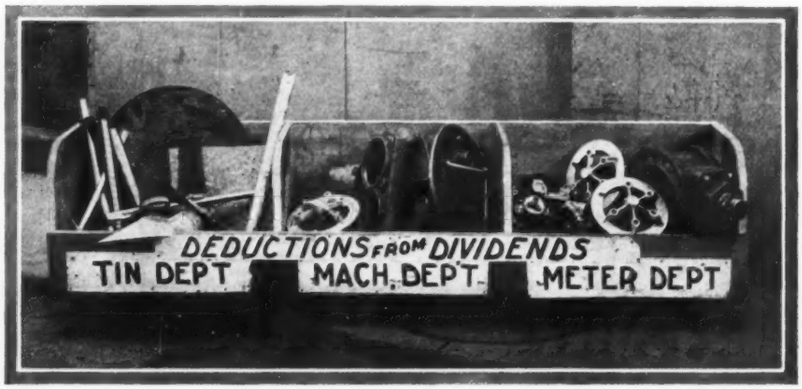
WHEN a worker turns out a large percentage of defective parts in the course of his labor, he wastes time, effort and money, both for himself and his employer, besides endangering the quality of the product. To eliminate waste labor, reduce the loss of time and money, and to improve the quality of their product, S. F. Bowser & Co., Inc., Fort Wayne, Ind., have installed a plan of displaying damaged and spoiled parts in bins to their employees.

Factory meetings, which are held at indefinite periods but occur about once a month, witness the gathering of all shop employees. Addresses are made either by officials of the company or by outsiders on different subjects calculated to promote efficiency. In recent addresses, the bins filled with damaged parts are wheeled in before the men and lectures have been given calling attention to the methods of increasing production through intelligent, efficient work rather than by hurried, careless labor.

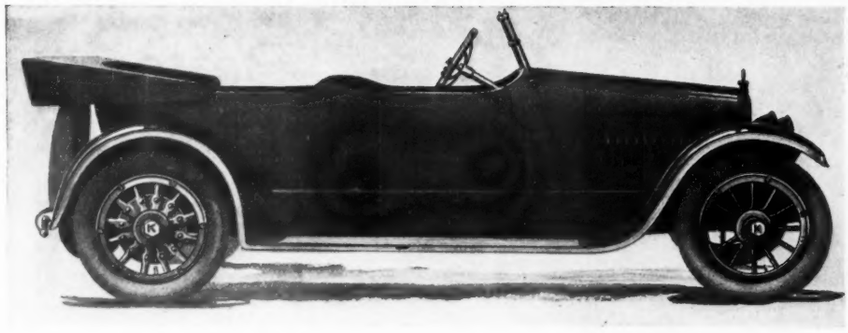
The company states, to its employees, that it is better business for them and consequently for the workers, to do a normal amount of work which results in perfect product rather than to produce a great quantity some of which must be scrapped because of defective workmanship.

The psychology of the sight of the damaged parts in connection with the address has been taken into account and the company believes that the plan will result in a better quantity of work and greater co-operation among the men. The idea is practically a new one and definite results regarding the merits of the plan cannot be stated at this time.

It is readily possible that further developments of the psychological principle embodied in the plan can be worked out to the mutual benefit of employer and employee. The various departments could be brought into a state of friendly rivalry as to which showed the best record as revealed by the size of the display of spoiled and damaged parts standing against it. Also the pride of the men in their work could be capitalized to the extent of rendering them ashamed of contributing through carelessness or poor workmanship to the pile of evidence arrayed against their respective departments. Other variations of the idea in accordance with the requirements of the plant to which it is applied could be devised.



Damaged parts on display at the plant of S. F. Bowser & Co., Inc., Fort Wayne, Ind.



Kent four-cylinder, five-passenger touring car selling for $985

Individuality in Kent Four

New Car Has 3¾ By 5-In. Engine and 116-In. Wheelbase — Standard Units Used Throughout Chassis—Body Lines Up to Date

INDIVIDUALITY of design, combined with the use of very high-grade units in the chassis, renders the four-cylinder Kent, produced by the Kent Motors Corp., with factory at Bellleville, N. J., and offices in New York City, a very substantial and attractive car, especially when its price of $985 is considered.

Unusual Magneto Mounting

The compact unit power plant, which is illustrated herewith, employs a 3¾ by 5-in. Continental engine that is stated to develop 40 hp., an output which is amply sufficient for the car, the weight being given as about 2500 lb., fitted with either the five-passenger touring body or four-passenger club roadster design. A two-unit Bosch electrical system is used for starting and lighting, ignition being by Bosch magneto. An unusual feature in the mounting of the units is that the generator is driven directly from a gear meshing with the crankshaft and the magneto is placed toward the rear so that it takes its drive from the generator. This arrangement is well illustrated in the accompanying view of the exhaust side of the power plant mounted in the chassis. Carburetion is by a 1¼-in. Zenith instrument of a special type fitted with spray adjustment. Fuel feed is by the Stewart vacuum system from a 15-gal. tank suspended at the rear of the chassis.

A disk-type clutch situated in the flywheel transmits the drive from this clutch through a three-speed and reverse selective gearset. The gears employed in this unit are of nickel-steel, heat-treated and chamfered for silent engagement, an example of the thorough way in which the little details which make for comfort of the passengers and silent operation of the car are worked out in the entire construction. The drive to the differential is by shaft in the conventional manner through two substantial universal joints.

Both axles are of Timken manufacture, the front being an I-beam type made of 0.20-0.30 carbon steel, and the rear axle has helical bevel gears, heat-treated and ground, the driving shafts of the axle being forged from chrome nickel-steel to insure the maximum of tensile strength and resiliency under driving stresses.

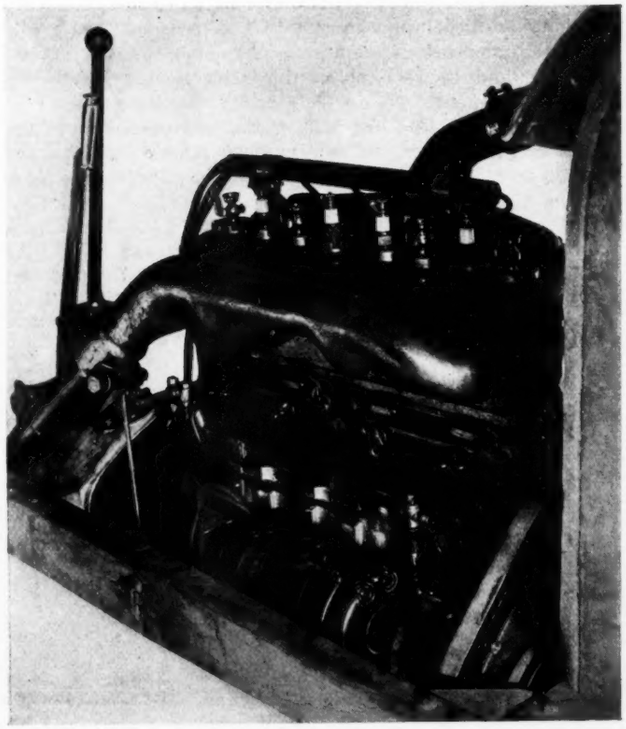
Brakes are provided in two sets, in conformity with general practice, the emergency set being of the internal-expanding type and the service brakes of external-contracting construction.

The frame, that unit of the chassis assembly which has been so often referred to as the backbone of the car, is typical of the strong though light-weight character of the construction. It is of pressed-steel channel section and made of 0.20-0.25 carbon steel, a 3½-in. kick-up at the rear insuring ample clearance over the rear axle on rebounds. To secure positive frame rigidity there are three cross-members, which are reinforced with gusset plates at the corners, all members in the assembly being hot-riveted. Springs are special alloy steel, heat-treated. Front springs are semi-elliptic and 36 in. long, and rear three-quarter-elliptic and 50 in. long. All are 2 in. wide and designed to insure comfortable riding for the passengers under all sorts of load conditions.

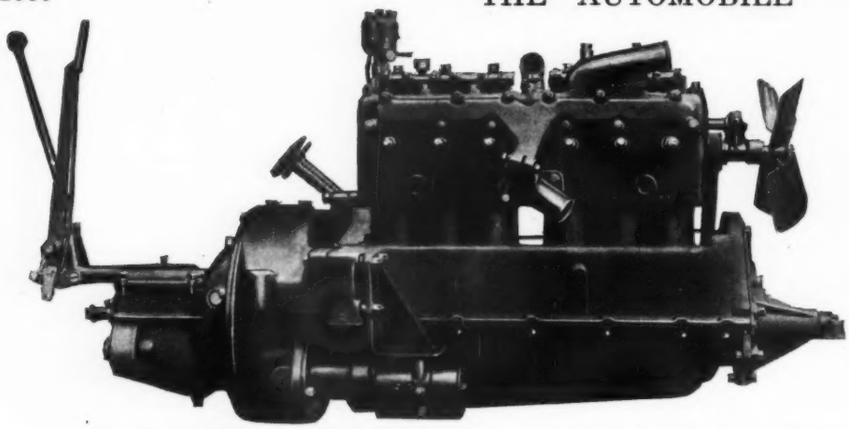
A wheelbase of 116 in. and 32 by 4-in. tires all around are additional factors which tend to give the Kent car its long, low, rakish appearance. The hood is high and the radiator is narrow, in keeping with the general lines of the design, and the low mounting of the body, in conjunction with the slanted windshield and raked steering wheel, impart an extremely smart appearance, an effect further accentuated by the double cowl and the horizontal placing of the top.

Equipment is very complete, some of the features which may be mentioned being top, slanting windshield, Stewart speedometer, 8-day clock and full kit of tools.

F. H. Clarke is president of the company and associated with him as directors are men prominent in the automobile, banking and other fields. As announced in THE AUTOMOBILE for Oct. 19, the Kent corporation plans to establish a plant in Belleville, a suburb of Newark, costing more than $500,000, and having potential capacity for 50,000 cars a year. The company occupied the first completed unit on Dec. 2.



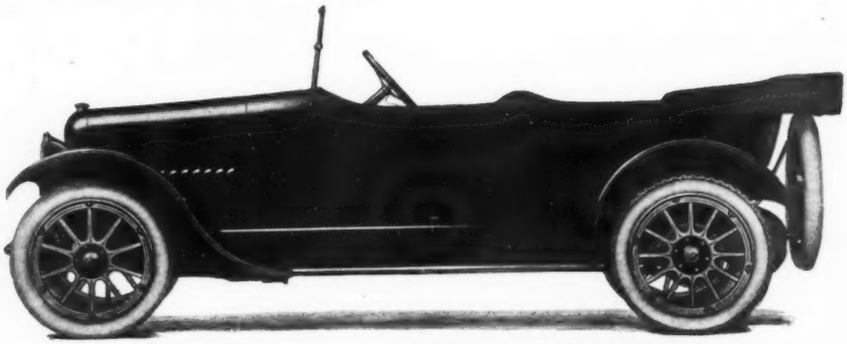
Kent power plant, showing magneto drive from generator



Falls six 3 by 4¼-in. engine used in Elgin. Note starting motor mounting

Better Springs on Elgin

New Model Improved—Heavier Frame Adopted



Four-passenger Elgin. A new model at the old price, $985

THE new Elgin six, made by the Elgin Motor Car Co., Chicago, is an improved edition of its immediate predecessor. The wheelbase is 116 instead of 114 in., and a much heavier frame is being used of the straight taper type. The springs have also had attention and the present layout is said to be extremely satisfactory. It will be noticed that the springs are mounted directly beneath the frame, and that they are practically flat, a characteristic which assists to eliminate roll. Also the springs are wider apart at the axle end than at the front end, since they follow the taper of the frame, and this certainly is a factor in their action on the road. The rigid frame, relieving the body of all stress, is contributory to the easy-riding qualities.

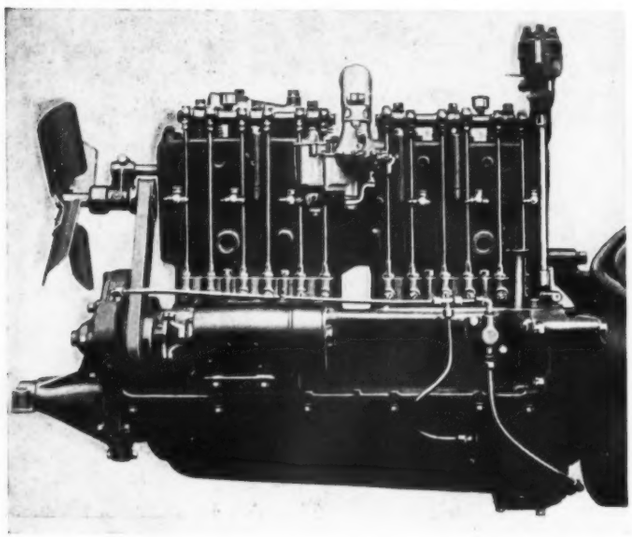
Overhead Valve Engine

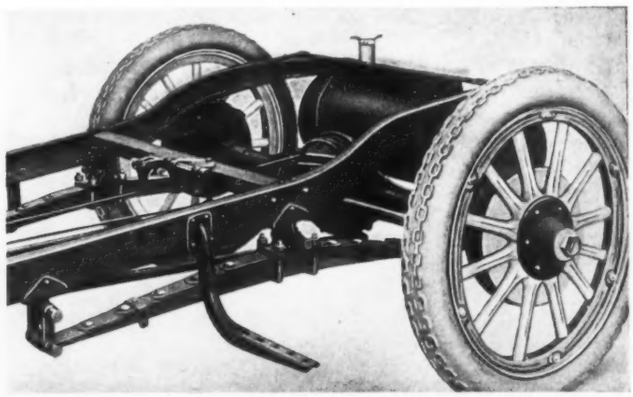
The power plant consists of a Falls engine with six cylinders 3 by 4¼ in., a Borg & Beck clutch and a three-speed gearset. The clutch is new to Elgin practice, and the ignition has also been changed to a Remy equipment with vertically mounted distributer. Wagner now supplies the generator and starting motor, the latter having Bendix flywheel engagement.

As shown in the illustrations, the engine has overhead valves operated from the camshaft by long push rods, and the valves come away together with the cylinder head. Lubrication is by combined pressure and splash and cooling is by thermo-syphon circulation.

The rear springs being cantilever a torque arm is, of course, used. The rear axle is full floating with a pressed steel housing and the complete differential with the spiral bevel gear can be removed without taking off the wheels.

The touring body seats five passengers and has a center cowl. It is upholstered in leather and the color is dark blue. The running gear is black but the wheels are painted light cream, with black striping. A new body is a four-passenger with divided front seats. This is finished in gray and has a rear deck underneath which there is plenty of luggage space. In a general way, the lines of the two bodies are strongly similar. For both cars the equipment is the same, including Jiffy curtains, Stewart speedometer, a motor-driven horn, and extra rim for the 33 by 4 tires. The price continues $985.





Above is the rear of the Elgin six-cylinder chassis, showing cantilever springs attached directly beneath the frame member. They are practically flat, which aids to eliminate roll. Note fuel tank mounting

At the left is the intake and valve side of the Falls six engine used in the Elgin, showing valve action and generator mounting

Otis Axles for 3½ and 5-Ton Trucks

Both Models Floating—Casing a Single Steel Casting —Straight Overhead Worm Used in Unit Assembly with Gear—Cast Steel Wheels Also Manufactured

THE latest addition to the ranks of manufacturers of truck axles is the Otis Elevator Co., New York, which has, of course, many years' experience in the production of worm gearing.

The Otis axles are at present being made for 3½ and 5-ton trucks, and are both of the floating type with a single cast-steel casing extending from hub to hub. This casting is made from electric steel in the Otis company's own foundries, and the manufacturers state that particular care is taken in the annealing process. Chrome-nickel steel tubes are forced into the casing at either end to carry the wheel bearings, a pressure of 20,000 lb. being used. The worm and gear are mounted as a unit assembly on a plate which bolts to the main casing, this assembly being spigoted in the case both above and below, so as to obtain a proper register and insure correct alignment. The worm itself is of the straight type, the manufacturer's saying that this has been preferred because with it adjustment is unimportant except in a direction at right angles to the axis of the worm.

Timken Bearings Employed

Either Timken roller or ball bearings are used, at the choice of the purchaser. When the roller bearing is used this is mounted in such a way that expansion of the worm shaft tends to loosen the bearing. With ball bearings, one end of the worm shaft is supported in an annular bearing and the other end as a double thrust bearing.

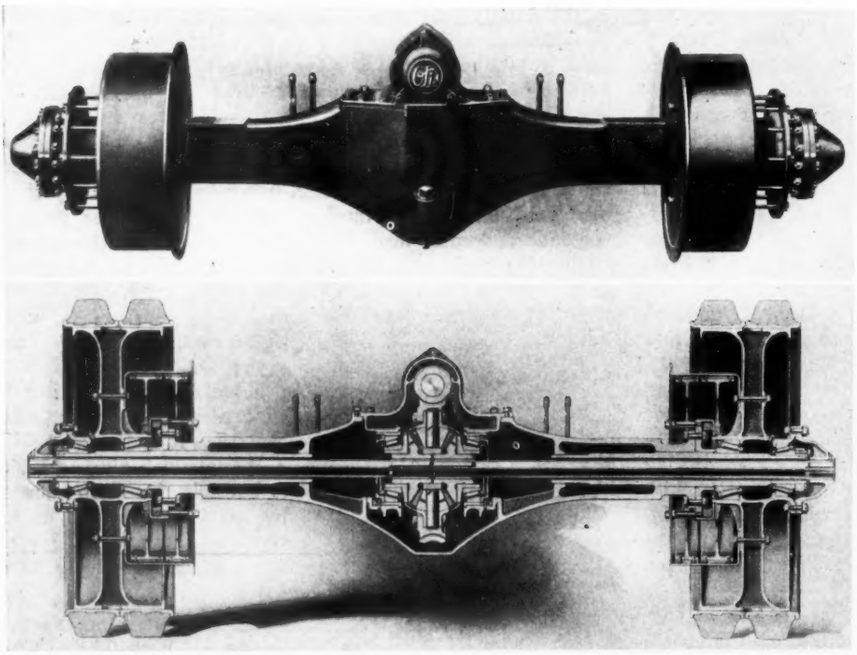
For the worm wheel bronze is, of course, the material employed, this being attached to an electric steel differential casing carrying the bevel pinion spider. The side gears of the differential are splined so that the drive-shafts are removable from the hub end of the axle, and it is noteworthy that an ample counter bore is used so as to make the engagement of the shafts easy when they are being put in place. In place of the bevel differential, one with spiral gears can be fitted if desired.

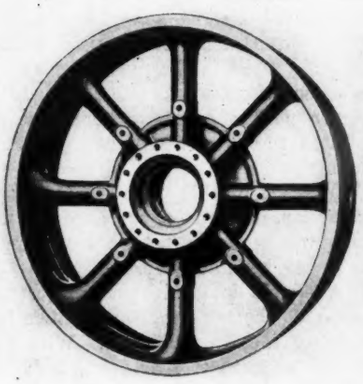
Both the brakes are internal, the drums being steel deeply flanged to prevent distortion. It is stated that the brake surface provided is exceptionally large and the way in which each brake shoe is mounted on a separate pin is of assistance both in smoothing the action of the brake and making the wear even. Great care has been taken with the detail of the brake work, the expanding cams and all other parts being hardened on their wearing surfaces.

Oiling Level Positive

For the road wheels, Timken roller bearings are used, the wheel hub having a plug for the insertion of lubricants. Oil for the worm is inserted through the filling plug at the center of the casing, and this is at such a height that only just the right amount of oil can be put in.

The Otis company is also making electric cast-steel wheels of European type, and announces that it is able to undertake large orders for these at the present time.





Above are illustrated exterior and section through the floating rear axle design produced by the Otis Elevator Co. for 3½ and 5-ton trucks. The casing is a single electric steel casting from hub to hub and the straight type worm is mounted in a unit assembly with the gear on a plate which bolts to the main casing. Chrome-nickel steel tubes are forced into each end of the casing under 20,000 lb. pressure to carry the wheel bearings. At the right are two examples of the steel wheels produced by the Otis concern, these being commercial vehicle types. They are of electric steel and are of cast construction

Six Johns-Manville Speedometers

Five Are New Models—Season Odometer 10,000 Miles—Trip Reset Improved

Special design to be standard equipment on 1917 Dodge Bros. cars

New model with flush ring for mounting on instrument boards

Combination instrument board and speedometer for Ford 1916 and 1917 cars

SEVERAL improvements in design and construction will be features of the speedometers to be produced for 1917 by the H. W. Johns-Manville Co., New York. The line consists of six models, five of which are new. There is a special design, which will be regular equipment on Dodge Bros. cars during 1917 with fittings as heretofore for transmission drive; a standard model for flush mounting; and a standard model for bracket mounting suitable for all makes of cars; a combination instrument board and speedometer for 1916 and 1917 Ford cars; another model for Fords, which is flush mounted in a suspension plate and attaches to the windshield strip; also a continuation of last year's bracket-mounted type for Ford cars. All models have 3¼-in. dials with 60-mile speed scale.

The chief difference in construction for 1917, in addition to the standardization of dials to 3¼ in., is the use of a new 10,000-mile season odometer movement instead of the 100,000-mile movement previously used. This change permits of making the odometer mileage figures larger, so that they may be more easily read. The previously used trip odometer reset mechanism, comprising a knurled wheel, projecting through a slot in the flush mounting ring in conjunction with a pressure button for engaging the reset wheel with the interior mechanism of the odometer, which construction necessitated the use of two hands when operating it, has been eliminated.

In place of this a new reset mechanism, simpler in construction, neater in appearance and much more rapid in operation and necessitating the use of only one hand to manipulate, has been adopted.

A simple knurled stem, projecting through a flush ring, operates the trip reset mechanism by merely pushing in and turning the knurled stem. With this construction the trip odometer is reset 2 or 3 miles with every turn of the stem, while with the previously used construction, the resetting process was very slow, as the odometer could only be set back a few tenths of a mile with each manipulation of the knurled wheel.

The Johns-Manville company finds that the trend in speedometer dial finish is toward the use of a black dial with white figures. For 1917 the company is prepared to furnish dials in this finish, as well as in the silver finish with black figures, which have been previously used to a large extent. All Johns-Manville instruments for the coming year will be externally finished in black and nickel and will embody a 60-mile speed scale, 10,000-mile season odometer and 100-mile trip with tenth figures in red.

The operating mechanism is unchanged from previous practice, being of the centrifugal governor type and using three accurately balanced brass weights, fastened with links to brass spiders, one of which is slidably mounted on the governor shaft, making a unit assembly of the governor mechanism with the driving spindle. The weights are controlled by a suitable spring and are caused to extend or dilate by centrifugal force, when the shaft carrying these weights is revolved through the medium of a flexible shaft and gears, connected to the road wheel. The spring is so calibrated in relation to the weights that they will diverge approximately in proportion to increases in speed and through the medium of suitable leverages or cams. This divergence is translated into miles per hour speed indication on a graduated dial.

Odometer drive is by worm and gear.

The entire interior mechanism is assembled as a unit on the cast frame before being put in the shell or casing. This unit can be lifted out of the shell, allowing of easy inspection.

The interior mechanism of all Johns-Manville speedometers is thoroughly lubricated when assembled, which lubrication is sufficient to last during the life of the instrument. The main points lubricated are the ball bearings at the top and bottom of the driving spindle, the gear and worm shaft, and the sliding sleeve on the driving spindle.

The special type speedometer for Dodge Bros. cars is called model 113H and is mounted flush in the dash without the aid of the usual flush ring, being held in place by three oval-head countersunk machine screws, which pass through the dash and enter nuts, permanently secured to three metal supporting clips, attached to the instrument case. The trip reset stem on this model projects through the dash at the right of the speedometer. The dial is black with white figures, graduations and speed indicator hand.

Model 101H is similar to that already described, except that it is provided with a special flush ring to make it suitable for flush mounting on various types of instrument boards. The type of reset on this instrument

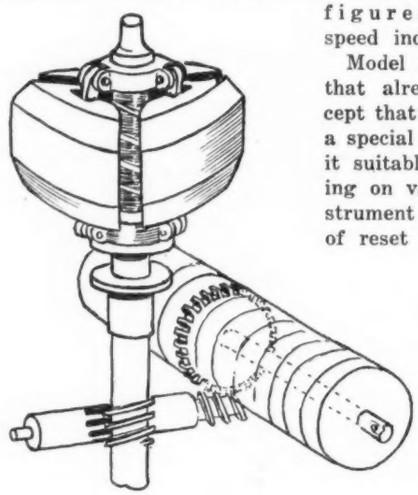


Diagram of centrifugal governor, shaft and gears used in the Johns-Manville speedometer. The cross shaft which transmits the drive from the vertical spindle to the odometer gears is also shown

is the same as on model 113H, except that it projects through a hole in the side of the flush ring to the right of the speedometer. The list price on model 101H, including fittings for front wheel drive, is $25.

The only difference between model 101H and model 101AA is that the latter is provided with either a rigid or adjustable type of dash bracket for mounting in any position desired to suit the car owner. In this instrument the trip reset stem projects from the right side of the case. Furnished complete with fittings for front wheel drive, this model sells for $25.

Special fittings can be provided to drive any of the three instruments mentioned from the transmission or universal joint, in addition to the front wheel drive.

The Ford car model especially featured is the combination instrument board and speedometer, the two being sold only together and called model 3009. The board is of maple, finished in dull black, to prevent any reflection of light rays into the face of the driver, and to match the Ford body. Adjustable metal and brackets are provided to compensate for variations in the width of Ford bodies. The instrument board also permits of mounting other instruments, such as clocks, starter switches, carbureter controls, etc. On this model the trip reset stem is behind the instrument board, and is readily accessible for operation. The speedometer is flush-mounted on the board and is finished in black and nickel, with a black dial, white figures, graduations, and speed indicator hand. Instrument board speedometer and fittings complete list at $11.25.

Another new speedometer for Ford cars is the suspension plate model, which embodies an instrument as previously described, except that the instrument is mounted flush on a black finished metal plate, which permits attaching the instrument to or from the windshield strip, thus mounting in a position where the speed of the car or the number of miles traveled can be easily read.

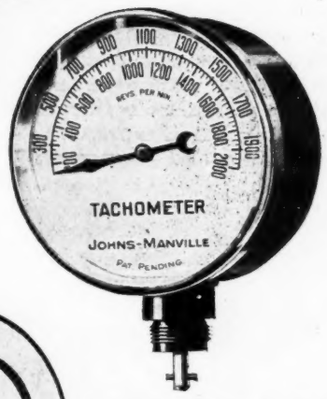
The trip odometer resetting stem projects from the right hand side of the speedometer case, and is readily accessible for operation. This consists simply of pushing in the knurled reset stem and revolving same until the desired mileage figure is attained. Price, complete with all fittings, $11.

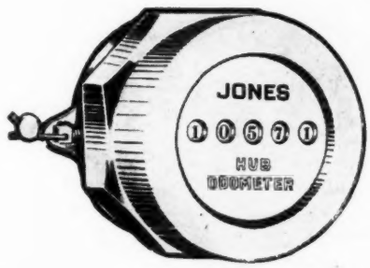
The other instrument for Fords, known as model 3000, is a continuation of last year's model 2001D, and has the dash bracket riveted to the back of the case. This instrument continues the use of the 100,000-mile season odometer, and is finished in black and brass, having a white dial with black figures, graduation and speed indicator hand. It also differs from the other models in that it uses a larger knurled trip reset stem. With all fittings this model sells for $10.

All three instruments for Ford cars can be furnished with straight or spiral swivel drive gear sections.

Upper left — Model 101AA for bracket mounting on dash Right — Suspension plate model for Fords which attaches to the windshield strip

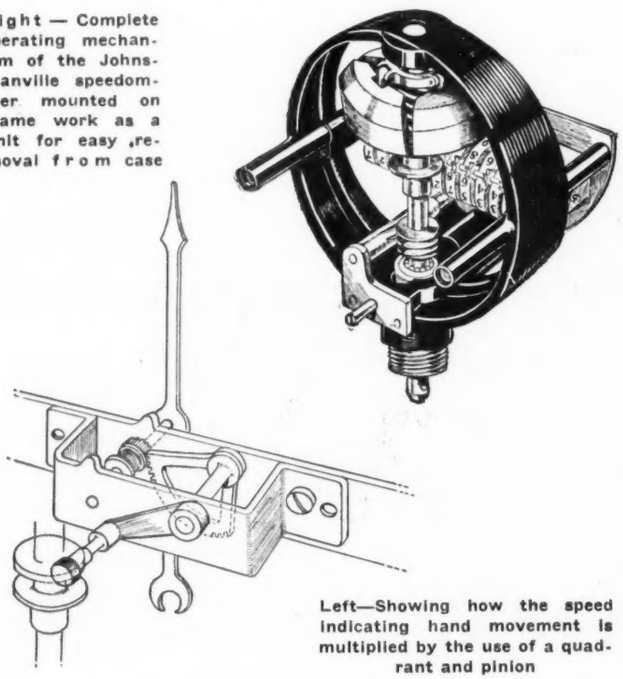
Above — Standard Johns-Manville speedometer for Fords with dash bracket and continuing the 100,000-mile odometer





Above — Tachometer for measuring crankshaft r.p.m. Made in four styles Left—Hub odometer for trucks

Right — Complete operating mechanism of the Johns-Manville speedometer mounted on frame work as a unit for easy removal from case



Left—Showing how the speed indicating hand movement is multiplied by the use of a quadrant and pinion

Hub Odometer and Tachometer Continued

The company is continuing the manufacture of the Jones hub odometer, which will be known as Johns-Manville in the future. The hub odometer is designed for truck use and has a 100,000-mile odometer movement. Prices are: Larger model, $20; type for Ford commercial vehicles, $15.

The tachometer is made in four models to show r. p. m. of engine shafts from 50 to 4000. The instrument is of practically the same construction as the speedometers except that the odometer movement is omitted, and the calibration and dial are different. Price, $30 in a 3¼-in. size and $40 in the 4-in. model.

Many Unique Points in Harroun

Lubrication System Includes Oil Radiator—Frame Is Particularly Rigid—Stroke to Bore Ratio 1.63—Cantilever Rear Springs With Inclosed Propeller Shaft

THE Harroun Motor Co., Detroit, Mich., a concern whose entrance into the manufacturing field has been awaited with so much interest, is about to produce a car selling for $595 possessing a number of striking engineering features. Dealing first with the specification, the engine is a four 3¼ by 5¼ in., and with overhead valves. The three-speed transmission and cone clutch are combined with the engine in a unit; the rear springs are cantilever; the bodies include a five-passenger and a three-passenger roadster at $595 and a sedan for $850, the wheelbase being 107 in. in each case.

Valves at an Angle

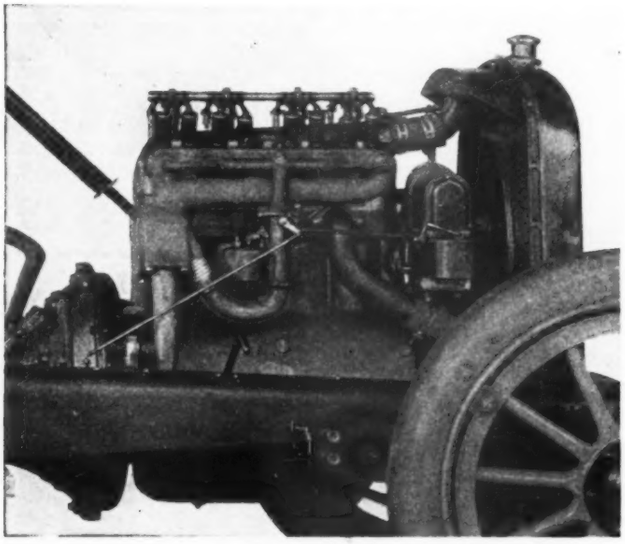
The cylinders have a detachable head and the valves are set directly in it, but an unusual feature is that they are at an angle instead of having their stems vertical. This allows the sparking plugs to be placed symmetrically with the valves, also in the head, thus following racing practice, such as might have been expected from Ray Harroun. The camshaft is in the conventional position in the crankcase, which is integral with the cylinders, and the valves are operated by push-rods and rockers. The camshaft is on the left side of the cylinders and the valves on the right, so the rockers are of considerable length. They are fulcrumed on a longitudinal shaft mounted above the cylinder outlet water header, and in this respect the engine is unique, there being no other like it in America or in any other country.

Exhaust gases go direct from the valve ports to the four-flange manifold, and a two-flange intake manifold is bolted to the cylinder head immediately above the exhaust branch, where it receives plenty of heat. The carbureter is a vertical Bell instrument, and there is a short length of vertical pipe leading to the horizontal portion that connects the two cylinder-head orifices. As shown in the illustration, the exhaust pipe has combined with it the stove providing hot air for the carbureter, and the instrument itself is so located that it will be kept fairly warm in its entirety.

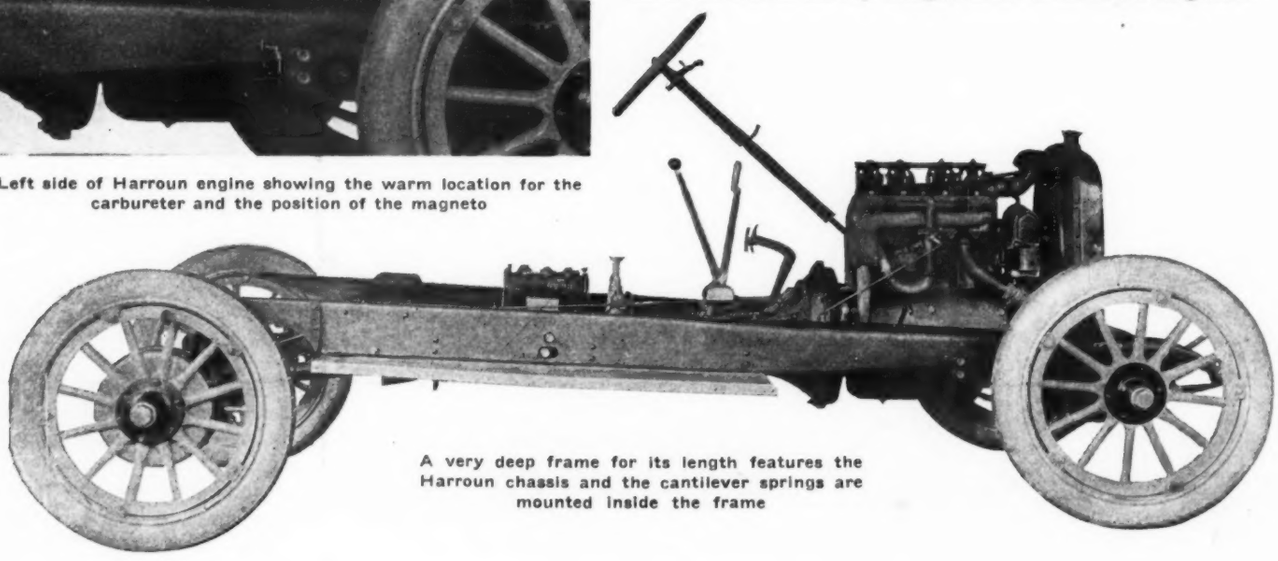
In the same illustration of the engine it can be seen that the thermo-syphon circulation is arranged so that the cool water enters just below the valves, so that the main flow is around the valve seats, where it is most required. On this side of the engine there is nothing except the carbureter, which is thus rendered ideally accessible. The end of the magneto shown in the carbureter side picture is that farthest from the wiring and contact breaker.

Ignition and generator current for battery charging are provided by a new Bosch instrument which has a magneto of the usual sort combined in one unit with a permanent magnet generator. This is mounted transversely at the front of the engine and its shaft is driven by a helical gear which meshes with the large timing gear, but in a plane at right angles to the latter. In other words the helical gearing acts as skew gearing also.

Lubrication is complete, there being a pump which supplies the main bearings by direct feeds that keep filled large cups above each bearing. Separate supplies are also taken to the camshaft and to the dip troughs beneath the connecting-rods.



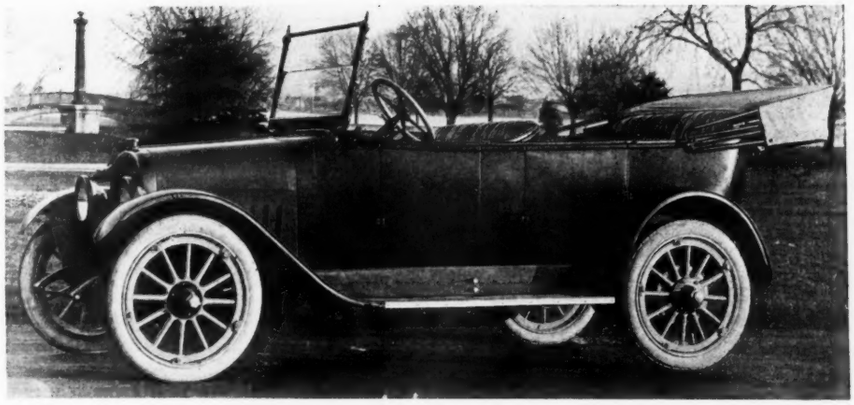
Left side of Harroun engine showing the warm location for the carbureter and the position of the magneto



A very deep frame for its length features the Harroun chassis and the cantilever springs are mounted inside the frame

As it comes from the sump the oil is sucked through a long, cast pipe, located on the side of the crankcase and having fins on its exterior, this being the oil cooling device. The pump is a plunger type and is driven direct off the camshaft, but it is operated by a proper eccentric and strap instead of by a cam and a spring in the conventional way.

The crankshaft is unusual also, as the middle bearing is about a half inch bigger than either of the end bearings. It is a narrow bearing and this coupled with the large diameter should make the shaft about as rigid as it well could be. The engine is a remarkably easy assembly proposition. It should be noted that the pistons at the top of the stroke come level with the top of the cylinder block, which means that all the combustion spaces are machined out of the head casting. Care is taken to have the spaces of exact size, so that compression in one cylinder is the same as in any other.



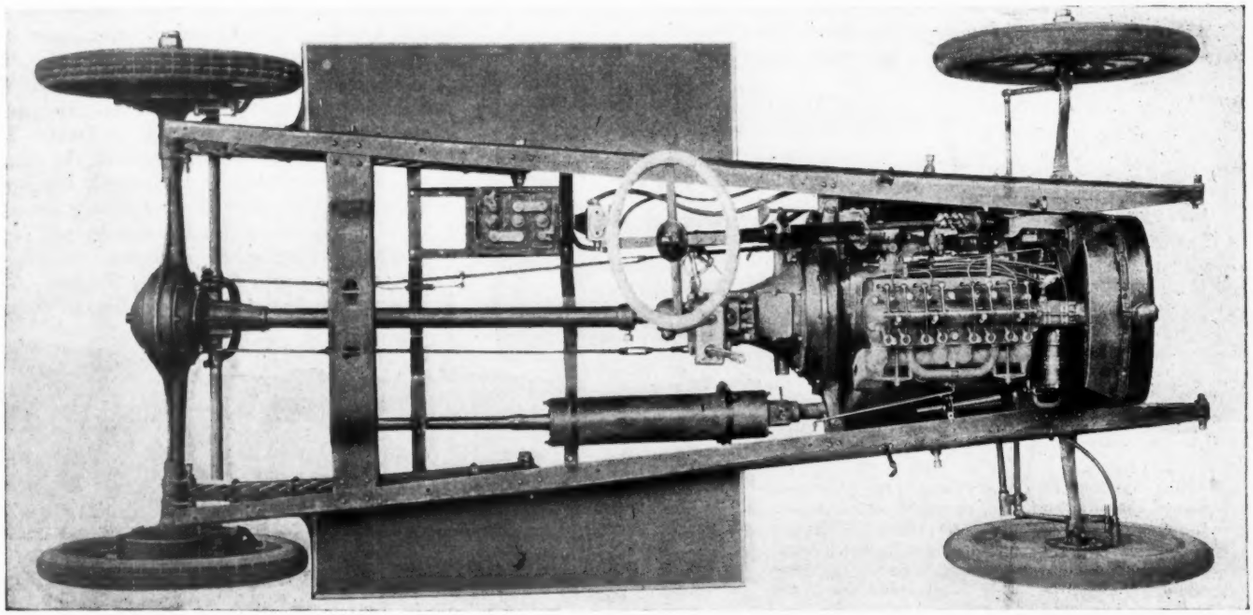
Five-passenger Harroun Four with standard equipment

About the pressed steel cone clutch and the three speed gearset there is nothing very remarkable, save, perhaps, that compactness in design is exhibited to an advanced degree. Behind the gearset there is a single universal, and then a torque tube to the pressed steel rear axle housing. This torque tube ends just behind the universal and has no frame connection whatever. There is an interesting detail of the brakework than can be seen in the chassis plan. The hand lever operates a solid shaft running from brake to brake right across the axle. So the hand brake mechanism is reduced to a simple pull rod and a plain cross shaft with one little lever on it. The foot brake is operated by tubes outside the shaft just mentioned, and there are two levers, one on each tube at the inner ends. These two levers are linked together by a yoke, seen in the chassis plan, which solidly connects the two tubes. It will thus be seen that there is no equalization in the brakes, many parts and a good deal of weight being saved in this elimination.

Of course, one of the features of the car is the frame which is so deep that the running board bolts right up against it without any sheet metal shields. The running board irons go right across the frame from side to side, thus acting as cross members and stiffening the frame very greatly. It is one of the most tapering taper frames ever built, and the way in which the cantilever springs are mounted inside the frame sections is also novel. These springs are also given a "spread" at the rear, and this is claimed to aid the spring action by damping out side stresses.

Yet another departure from conventional design is found in the steering. First, the steering gear is bolted to the crankcase, instead of to the frame, and the connecting-rod works across the frame instead of fore and aft. This allows the gear to be placed far forward, giving the column a good rake. The wheel itself has leaf springs as spokes, these being claimed to damp vibration and to make the wheel pleasant to hold for long periods. Furthermore the steering gear can readily be mounted on either the right or left side, the whole car being designed so that it can be made either way without special parts.

In the body a conventional outward form has been adhered to, and the finish is a green with which the khaki top contrasts. The driver and front passenger have not been neglected for the sake of the tonneau occupants, so that any one of the five seats is as good as another. All the usual things come with the car, but the inclusion of both a clock and a speedometer is not conventional on so low-priced a vehicle.



Plan of Harroun Four chassis, showing cross member step irons and wide flare on taper frame

King Adds Four-Passenger Model

Foursome Is Development of Club Car Idea—Is Mounted on Standard Eight-Cylinder Chassis Which Is Altered Only By Refinements—Touring, Roadster and Sedan Are Improved

UNDER the model number EE the King Motor Car Co. has continued with refinements the No. E eight made last season. One addition has been made to the line in the shape of a new body of four-passenger capacity. Other than this the changes in the King cars are chiefly in minor refinements of a mechanical nature and slight alterations in body detail.

The new four-passenger King is a development of the club car idea, with the objectionable points removed. The body provides plenty of room in the rear compartment, giving all the advantages of the close-coupled touring design with the lines of the roadster preserved. The other three bodies on this chassis, the seven-passenger touring car, three-passenger roadster, and seven-passenger sedan, have also been refined in construction and appearance in bringing the models up to the standard set for the 1917 season.

No Radical Changes

Mechanically, there are no changes which rank as important or radical. The brakes have been improved, there is a new gasoline system, the Stewart vacuum, the radiator is larger and better shaped, the tie rod yoke has been redesigned and there are one or two small alterations in the crankshaft.

The brake changes affect both the service and the hand brake, the latter being mounted as in previous King models on the end of the transmission shaft. The change is the insertion of a spring link in the line, so that any desired tension can be placed upon the brake linkage, thus tightening the brake as firmly as desired and allowing the car to be left safely upon any gradient without danger of rolling. On tightening the brake it is possible to set the brake as it would be with the ordinary type of linkage and then upon further pull on the hand lever, the brake can be tightened four more notches on the brake quadrant.

On the foot brake the change is in the insertion of an equalizing mechanism at the rear, it was formerly solid from the pedal all the way back to the brake levers on the rear axle.

On the engine there has been two slight alterations in the crankshaft. These are in the increase of the thrust flange area at the center bearing and in the use of a crab for holding the valve tappet guide in place. The shaft has a diameter of 1 13/16 at the center bearing and the flange originally had a diameter of 2⅝ in. The diameter is now 3½ in. This about doubles the area of the thrust surface on the center bearing. This is a three-bearing shaft with side by side connecting-rods.

The use of the crab instead of the plate formerly used has the advantage of not tending to bind the guide for the tappet. Another change which is rather part of the oiling system than of the crankshaft is the installation of an oil throw-off at the rear bearing. This is in the form of two grooves, and after the oil is thrown from the shaft it drains back to the crankcase and joins the other circulating oil. There are no other changes in the oiling system.

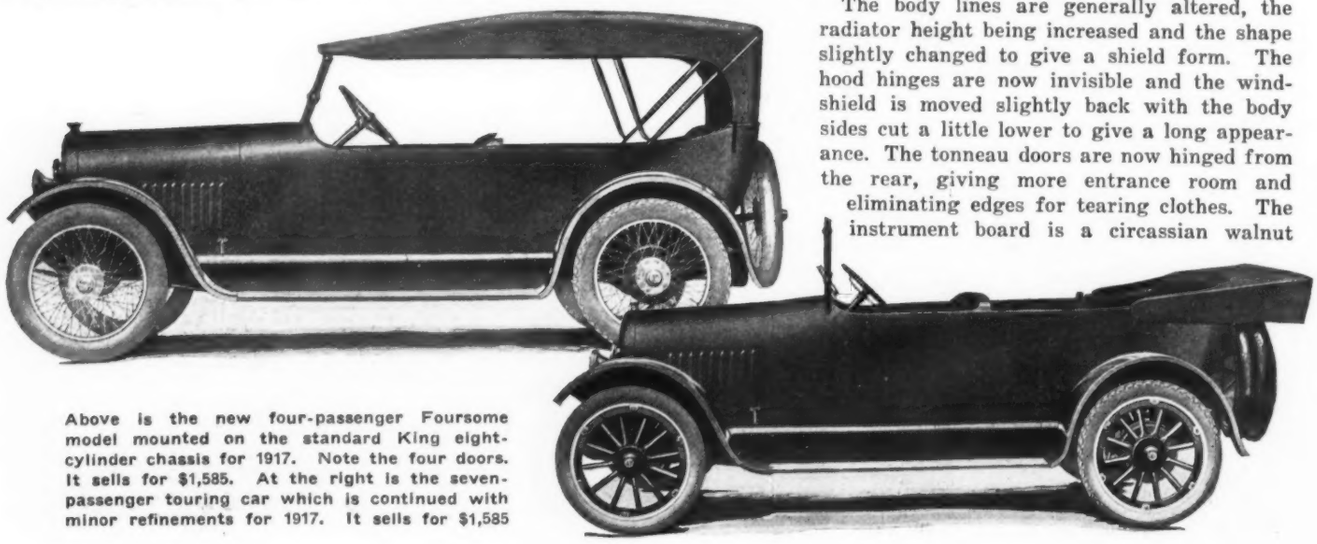
One of the alterations of detail which represents a valuable addition to the safety of the car is in the connection of the tie rod end to the steering arm. This is now a forked yoke connection with a bearing both above and below. In addition to the larger bearing space provided, the yoke connection is better connected to the cross arm by means of two clamp bolts instead of one.

A minor detail which is illustrative of the care taken to prevent rattles is in the use of a full length steering column sleeve which now extends from the wheel to the steering gear housing whereas it formerly only went down as far as the dash.

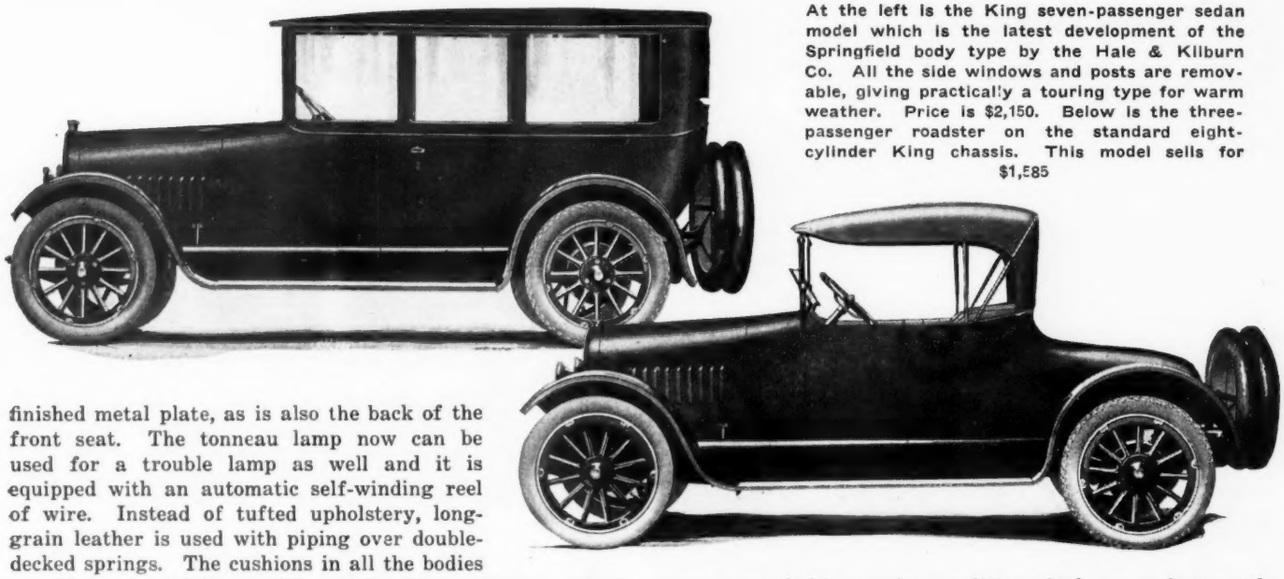
Line Now Complete

In putting the four-body line upon the single chassis, a complete range of cars is given. The price is $1,585 for the seven-passenger touring, four-passenger foursome and three-passenger roadster and $2,150 for the sedan.

The body lines are generally altered, the radiator height being increased and the shape slightly changed to give a shield form. The hood hinges are now invisible and the windshield is moved slightly back with the body sides cut a little lower to give a long appearance. The tonneau doors are now hinged from the rear, giving more entrance room and eliminating edges for tearing clothes. The instrument board is a circassian walnut



Above is the new four-passenger Foursome model mounted on the standard King eight-cylinder chassis for 1917. Note the four doors. It sells for $1,585. At the right is the seven-passenger touring car which is continued with minor refinements for 1917. It sells for $1,585



At the left is the King seven-passenger sedan model which is the latest development of the Springfield body type by the Hale & Kilburn Co. All the side windows and posts are removable, giving practically a touring type for warm weather. Price is $2,150. Below is the three-passenger roadster on the standard eight-cylinder King chassis. This model sells for $1,585

finished metal plate, as is also the back of the front seat. The tonneau lamp now can be used for a trouble lamp as well and it is equipped with an automatic self-winding reel of wire. Instead of tufted upholstery, long-grain leather is used with piping over double-decked springs. The cushions in all the bodies are 10 in. in thickness, this making for extreme comfort.

Just inside the windshield there are placed louvres for ventilation in warm weather. The top is better finished with a German silver binding at the front and rear. The top now fastens to the windshield with an automatic catch and the top material is the De Luxe Neverleak.

In the Foursome body, the four-passenger roadster idea is departed from in that there are four doors. Everything has been done to get low rakish lines, the windshield, for example, being sloped to an angle of 20 deg.

The Seven-Passenger Sedan

The seven-passenger sedan is the latest improvement of the Springfield type, manufactured by Hale & Kilburn Co. All the side windows are removable as well as the posts, giving practically a touring car with top up when desired for warmer weather. The seating arrangements are the same as for the seven-passenger touring car with the exception of the front seats, which are divided.

The chassis remains essentially the same. The unit power plant includes a V-type 3 by 5-in. eight, fitted with Atwater Kent ignition, Ball & Ball carbureter and Ward Leonard lighting and starting, with Willard 6-80 battery. The tire equipment is 34 by 4 with non-skid rear and wire wheels optional at $100 extra. The wheelbase is 120 in.

A plate clutch is used transmitting the drive through a three-speed gearbox, two Spicer joints and propeller shaft to a floating axle. The drive is taken through the 48-in. rear cantilever, but the torque is taken through a separate member of triangular design.

Using Old Tires

By Charles Vivier

JUST as the best chain fails at its weakest link so does the best tire fail at its weakest spot. It seems that in the majority of tires the carcass is much weaker than the tread; as a matter of fact, a casing subjected to ordinary touring use blows up within 25 to 30 per cent of its ultimate possible mileage, when a few thousand miles of perfectly good rubber still remain unused. Through neglect or accident, the blow-out occurs much sooner. Among the chief causes which are conducive to premature blow-outs, touring conditions considered, are under-inflation of casing when new and over-inflation when old, glass cuts, stone bruises and also tangential nail punctures. The modern pneumatic tire possesses remarkable wearing qualities which are unfortunately equalled by the high cost of the finished product. With the present price of gasoline, motoring costs about as much for tires as for fuel and oil; therefore, it behooves the motorist to save on tires as well as on fuel; to get the largest tire mileage with the least cost.

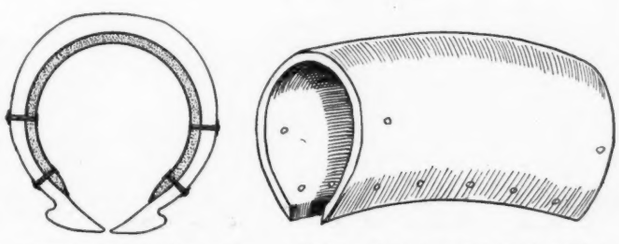
Repair Is Cheap

A blow-up casing can be efficiently and inexpensively repaired by riveting on the inside a patch (made from an old tire of the same size), covering the injured part. All the tools necessary consist of a hammer, a riveting tool and a leather punch; the material; some copper rivets and patches, according to the size of the casing to be repaired. Of course, such a riveting task is not very easy, especially for large size tires, but any one who has elementary notions about riveting leather can do a neat and dependable job, proceeding as follows:

Simple Materials

For a 4½-in. tire, for instance, get 1-in. copper rivets and burrs; hammer the ends of the rivets to a sharp point. For the inside patch, get a sufficiently large section (with the bead and rubber removed) from a discarded 4½-in. tire. Punch a few ⅛-in. holes, for the easy insertion and driving of rivets, about 2½ in. apart on each edge of patch, as per illustration. Then hammer or force the rivets into a riveting position, taking care that the patch is not too loose nor too tight when the tire assumes its normal curve.

This method can take care of a fairly serious blow-out, no matter if the wound is near the bead or across the tire. As 15 to 20 cents' worth of rivets are sufficient to repair an ordinary blow-out on a 4½-in. tire, the riveting process compares most favorably with the more expensive jobs of vulcanizing or of sewing two old casings together, in the approved manner.



Simple method for using up old tires described by Chas. Vivier

Maxwell Adds 1-Ton Truck To Line

25,000 To Be Built on Standardized Production Plan—Three Body Models To Meet All Requirements

ALL the manufacturing facilities of the Maxwell Motor Co., embracing the three plants at Detroit, Dayton, Ohio, and New Castle, Ind., will concentrate on the new 1-ton Maxwell truck as well as on the passenger car. A manufacturing program of 25,000 trucks has been embarked upon, and the distribution will be taken care of through the regular Maxwell channels.

Three standard body models will be mounted on the 1-ton chassis, designed to meet the needs of practically any line of business. The field which it is intended to serve includes such trades as the grocers, dry goods, meat dealers, laundries, bakeries, baggage and transfer companies, hardware dealers, painters, hauling contractors, builders, lumber dealers, and a wide variety of other vocations where a 1-ton truck will be suitable.

Coincident with the manufacturing plan, an elaborate service scheme has been laid out so that in all parts of the country owners will be able to get repair parts on short notice. The Maxwell organization of 3000 dealers and branches will maintain service stations for Maxwell trucks as well as for the passenger cars, and they will be at all times required to keep a supply of spare parts on hand. The warehouse system will also be used, so that regardless of the location of the dealer he will be able to be supplied with spare parts on 12 hr. notice.

Chassis Parts Like Passenger Car's

A standardized production scheme which fits in well with the Maxwell quantity production methods can readily be used in connection with the truck and passenger car, as the majority of the chassis parts are the same. In fact, the design is similar to the passenger cars throughout, except for the rear end. The truck has a 124-in. wheelbase and is so arranged that the major part of the load falls on the rear axle. The chassis frame work and rear end are strongly constructed for heavy-duty work. The wheels are 32 by 3, equipped with solid tires, in front, and 32 by 3½, with solid tires, in the rear. The body platform is 8½ ft. long.

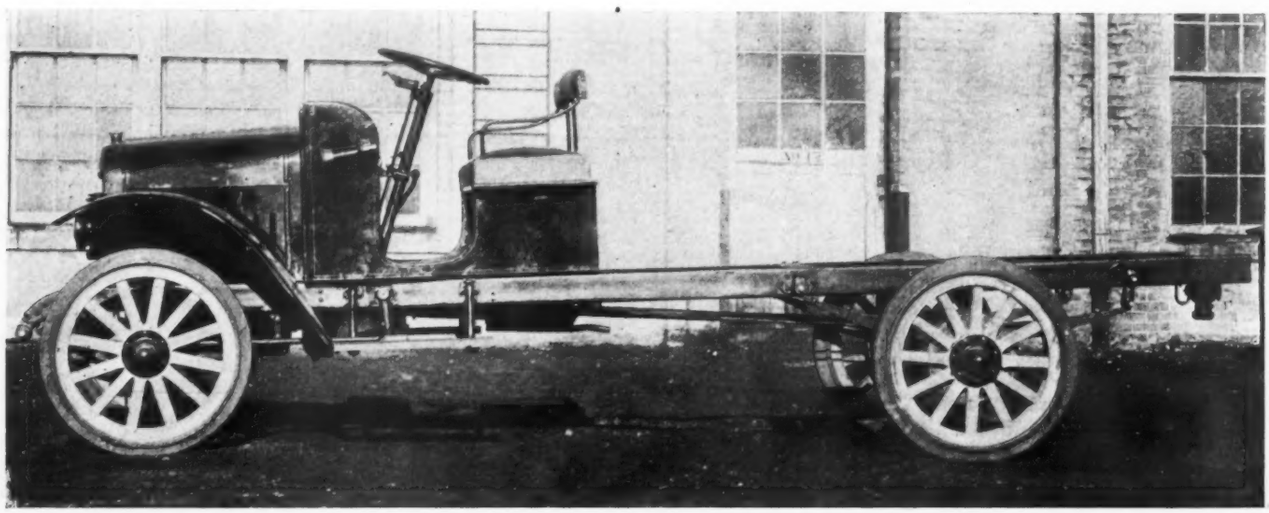
Worm drive is used for the rear transmission in connection with a three-quarter-floating axle housed in an exceptionally rigid malleable-steel housing. Heavy artillery truck wheels are used and circled by steel rims and carried upon heavy-duty roller bearings. Another feature of the chassis, which shows the care used in securing the greatest possible strength and rigidity, is the heavy cross-members which are riveted and strongly bracketed to the side channel members of the frame. Semi-elliptic springs front and rear also are of special design to take the particular stresses which will fall upon a truck of this size subjected to continual running over all sorts of road conditions and at speeds in excess of what is general practice in truck usage.

The Three Body Styles

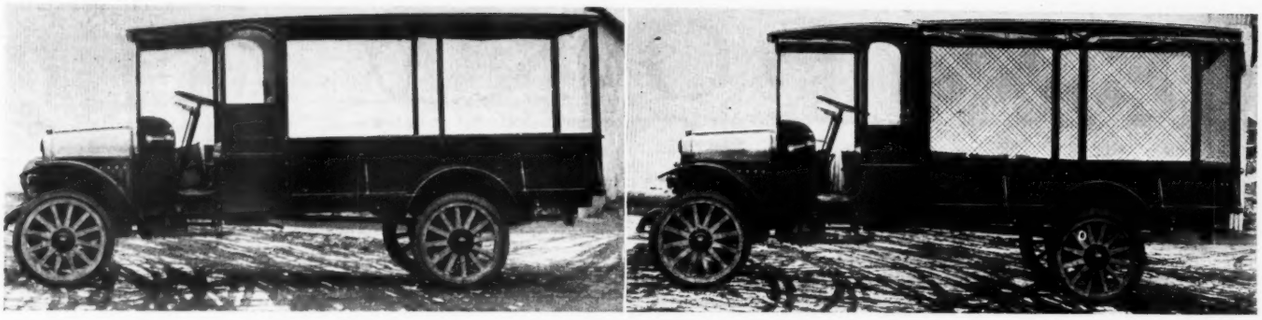
The three body lines are regulation box style, an open express and a screened express. The same style of chassis and cab is used for all three, and, if need be for certain lines of business, more than one body can be had for a chassis, thus giving an opportunity to use the particular style of body desired with the work in hand. The open express lists at $805; the screened express, equipped with a roof and side screens, at $845, and the regulation box, provided with a continuous roof, at $840. The chassis sells for $760.

The same power plant used in the Maxwell passenger car is employed. It retains its bore of 3⅝ in., with a stroke of 4½ in., and has a formula rating of 21.1 hp. and a displacement of 185.8 cu. in. The cylinders and the upper half of the crankcase are cast integrally. The valves and manifolds are on the right, along with the Sims high-tension magneto.

The crankshaft is carried on two bearings, each 1⅞ in. in diameter, the front being 2½ and the rear 2 13/16 in. long. The lower rod bearing is 1⅞ by 1½. The camshaft diameter is 1¼ in., the front and rear bearing lengths being respectively 1 13/16 and 1⅜ in. The cams act directly upon flat mushroom-type followers which operate the 1 9/16-in. valve. Throughout the entire engine conventional practice rules, with all dimensions on the safe side. The cast-iron pistons



Maxwell 1-ton truck chassis, showing the substantial simplicity of the design, which is to be produced on a standardized production plan



Two types of body on Maxwell 1-ton chassis, giving a good idea of the ample length

have two rings above the wrist-pin and a scraper ring below. The piston pin is locked in the boss on each side of the upper connecting-rod bearing. The rods are I-beam sections.

Oiling is by splash, with supply carried in the pressed-steel bottom pan which when removed leaves the entire interior free for inspection. The oil is circulated by a camshaft-driven pump, being circulated directly to leads beneath the rod bearings, from where it is splashed to all parts of the engine. There is an oil-level indicator on the crankcase.

One of the features of the power plant which will be appreciated in truck usage is its accessibility. By removing the stud bolts in the head the entire top of the engine can be taken off, along with the spark plugs, exposing the valves and combustion chambers. For valve grinding and carbon removing the time spent in reaching the desired parts has been minimized. To reach the other units it is necessary to drop the engine pan, which allows the repairmen to reach the lower rod bearings or the main bearings. To remove the piston and rod assemblies the lower rod bolts can be removed by dropping the bottom of the crankcase, and the pistons can then be taken out of the top when the head is off the block.

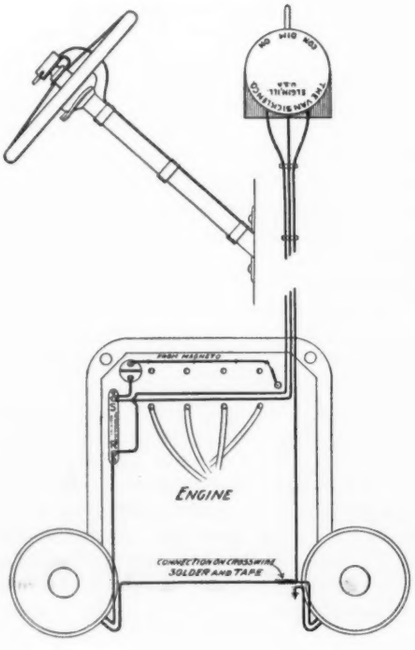
The Maxwell clutch and three-speed gearbox have been retained as used in the passenger car. The clutch is a cone, with a woven asbestos face which is oilproof. The clutch is completely housed with the flywheel in the unit plant, and operates in oil.

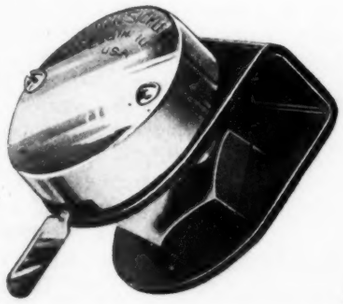
From the gearset to the rear wheels the propulsive units are altogether different from the passenger car. The propeller shaft, instead of being considerably longer for the 124-in. chassis, has been made more rigid by dividing its length. The drive is carried in two sections. The first member reaches a point between the axle and the gearbox, where it is supported by one of the cross-members of the frame. From this point a universal joint transmits the drive to another length of shaft which reaches the rear axle. This style of divided drive eliminates the tendency to whipping and also gives a maximum of flexibilty. It is expected by Maxwell engineers that this will prolong the life of the axle bearings, due to a reduction of the stresses ordinarily caused by the whipping tendency.

The Hotchkiss drive is used, and has been found to work out to particular advantage in connection with the divided propeller shaft and heavy truck springs.

For some time there has been considerable discussion regarding the possibility of a light vehicle which will take the place of a one-horse wagon or, to even better advantage, a number of one-horse wagons. The range of a light truck in miles per day is much greater than that of a horse vehicle, and therefore, to take advantage of this range and at the same time have the truck operate economically, it is necessary that the capacity shall balance the distance which it is able to travel.

Van Sicklen Lighting System for Fords at $4





Above — Van Sicklen dimmer and intensifier switch, showing attachment for top of Ford steering column

Above at left—Headlight switch, showing simple method of attaching. Note convenient location of headlight control within thumb-reach of the driving hand

At left—Wiring diagram of the Van Sicklen headlight dimmer and intensifier equipment, showing method of installation

COMPOSED of but three parts and so simple that it can be installed in 3 min. without interfering with the regular wiring in any way, the Van Sicklen Headlight Dimmer and Intensifier equipment for Ford cars has been perfected by the Van Sicklen Co., Elgin, Ill., and is marketed by the Beckley, Ralston Co., of Chicago. This device, which is illustrated herewith, is claimed to furnish a uniform light under all conditions, a flip of the switch to Int. giving a clear penetrating light, turning it to Dim softens it to a mellow glow which complies with all police requirements, and for ordinary conditions when the normal light produced by the Ford lighting system is desired, flipping the switch to On restores it.

Easily Attached

The addition of three short wires and the switch, which is mounted on the top of the steering column, comprise the installation, which does not require further attention when once mounted. The device sells for $4 complete.

The FORUM

Overloading and Rating of Trucks

By Edward T. Birdsall, M. E.

CAUSES—The practice of loading trucks beyond their rated capacities by owners and users has been the subject of many articles in the business press, and productive of many plans by the manufacturers of both trucks and components for its elimination, but all without substantial results.

The difficulties of regulating the abuse are many and most of them quite beyond the power of the manufacturers to cope with.

Among the principal causes of overloading are—

1—Lack of supervision on the part of the owner over the employees loading and handling the truck.

2—Lack of appreciation, or indifference, of the owner as to the evils of overloading.

3—Ignorance of the owner and employees as to the weights of the materials or items composing the load.

4—Exigencies of trade which make occasional overloading at any cost unavoidable. A few instances of this sort not followed by immediate breakage engenders confidence in the minds of the owner and employees that the truck is capable of carrying a load in excess of its rated capacity without injury.

5—Observation of instances of overloading, without apparent bad results, on the part of other users.

6—Ability of the power plant to pull the overload.

7—Statements of over zealous or mercenary truck salesmen that the truck will stand up under excess loading.

8—Fitting of oversize tires. This may have primarily been done to increase the tire life, but with an extra tire load capacity overloading of the truck soon follows as a natural sequence.

9—Natural growth of a business to a volume too great for the truck equipment, and reluctance of the owner to purchase additional units in advance of absolute necessity.

10—Willful overloading. In a few cases owners have argued that the aggregate value of overload ton miles carried, plus the sale value of the wreck, will in a year amount to a sum more than sufficient to pay for a new truck.

Requirements Vary With Trade

In addition to the above, every trade using trucks will be found to have special requirements or conditions peculiar to itself that will lead to occasional or more or less continual overloading.

Cause No. 3 is regarded by the writer as the most prolific cause of overloading.

Remedies—Much thought has been expended on plans, devices and what for a better name might be called subterfuges to remedy the evil. Prominent among these are:

a—Cancellation of the guarantee when overloading is discovered or persisted in.

b—The education of owners and users by published articles, pamphlets, advertisements, arguments and thinly veiled threats.

c—Bonus payments to drivers for maximum mileage coupled with minimum repairs.

d—Grading the springs so that by observation or effect an overload is made evident.

e—The employment of an expert to supervise the service. This, of course, is only possible where fleets are operated.

f—Indicating alarm or recording devices.

g—Use of a motor too small to pull the overload.

Of the above remedies, the use of a motor too small to pull the load is obviously impracticable.

Recording and alarm devices are soon neglected except by the manager of a fleet, in which case they only act as checks to other methods.

The bonus system to drivers I believe is good under all conditions, but must be impartially and systematically kept up. It is in the same class as "piece work rates" and must not be handled so as to bring discredit to the plan.

The springs are to a certain extent visible scales weighing the load, and can be used as rough indicators of overload.

The scheme of having the projecting body touch the tires under overload is impracticable as expensive injuries to the tires will occur, which no owner would tolerate.

The best suggestion in this line that has come to the writer's attention is to so proportion the springs that they are exactly straight or flat under the normal loads, but reversed under overloads.

Inspection Shows Condition

A mere inspection of the truck, even when in motion, at once discloses the condition of the loading. This plan to be of real value, however, necessitates the installing of special springs to fit all conditions arising from the different weights of bodies. Four or five sizes would probably cover most cases.

The writer believes that only the education of the owner and user will accomplish the end desired, and this will take a considerable time to fully accomplish. There will always be a minority of owners who will be indifferent to their welfare and impervious to argument. But the truck industry will soon be so large that the bad effect of this small class will not be felt by the industry at large. These are the same people who to-day are overloading their horse teams but obviously without the slightest effect upon the sales of the horse and wagon dealers or upon more sane owners.

It is a question whether the industry at the present time is in a strong enough position to take any drastic action in the matter. It seems that a persuasive yet forceful educational campaign which would hold a dollar bill constantly before the eyes of the owner is about all that can be done at present. The arguments against overloading should submit definite figures and not mere platitudes. They should give concrete facts and not a series of "Don'ts."

The campaign would be best inaugurated by an association of truck manufacturers, and not by individual builders, as it would thus have more weight and would eliminate the personal self-interest factor. It would also divide the burden of cost so that even an extensive and prolonged campaign would not be a hardship on any individual maker.

Rating Important

Closely allied to the question of overloading is the subject of truck load ratings. An investigation of the ratings of the various manufacturers at once discloses wide differences in the sizes and apparent strengths of the various parts on which the load rating must be based. The two components that have the most influence on the rating are the axles and the tires. The tire makers are now fairly well agreed as to the proper sizes of tires for various loads, but the axle manufacturers do not seem to be in very close agree-

ment. The tendency of the last 2 or 3 years has been to rate axles with an excessive factor of safety, if good roads and normal speeds are factors of the rating. They evidently rate them for rough roads, overloads and excessive speeds. This of course is a safety-first play for the axle maker, but works a hardship on the truck manufacturer as to costs, as the principal makers of axles refuse to sell or deliver if the advertised truck load rating is higher than their axle rating.

As the surface on which the truck travels is just as much a part of the transportation mechanism as the truck itself, it seems only logical and fair that it should be considered as one of the factors in the rating. This, however, at once raises a host of problems and complications of manufacture, selling and use that run hopelessly counter to design, production and profit.

For example: A given truck, with suitable minor changes in detail, might economically carry 4 tons at 10 m.p.h. on very good roads, but only be good for 2 tons on bad roads at 6 m.p.h. The possibilities of the truck industry when the owner's education has reached an elevation that would permit the truck builder with safety to meet such a condition, is beyond conjecture, and I fear far in the future. An examination of the trucks on the market shows clearly that some have their ratings based on good roads, have a resultant low price, and seem to be "getting away with it." Others are evidently rated for the worst roads, have a resultant high price and smaller production.

Decision Is Difficult

It is difficult, under present conditions, to decide which is right. It is comparatively easy to select and recommend a suitable truck for a particular set of conditions of operation and use, and all will be well as long as the truck is confined to its original location and use. When, however, for any reason, the truck is transferred to a new owner, location and use, then in a majority of cases trouble will develop, which under present conditions will reflect unfavorably on the manufacturer.

It would seem, therefore, that the education of the present owners and users, and the future truck-owning portion of the public, in the correct use of power vehicles is the first step to be taken.

The logical body to carry on the work of evolving a new rating is the standards committee of the S. A. E. The committee should be composed of truck makers and the findings of the committee should have the approval of at least 75 per cent of the manufacturers before making its report at the summer meeting of 1920.

Tires Pumped Too Hard

By O. B. Parkinson

MOST tires have lettered upon them the legend: "Inflate to — lbs.," inserting the figures 70, 80, 90 or 100, according to the size of the tire, and the ideas of the maker. It will be found that upon inflating a tire to the full pressure stated, that the tire becomes practically a solid tire. Many drivers when inflating their tires at a garage where air pressure is obtained, inflate their tires 10 lb. or more higher than the maker specifies, with the idea that it will save pumping again for a longer time.

Why is a pneumatic tire used? It was found that with the earlier types of cars having an extreme speed limit of not over 20 m.p.h. the solid tires with which these cars were equipped were the cause of excessive vibration which crystallized the steel of the car, shook loose the nuts and bearings, broke springs, and made the vehicle a most uncomfortable conveyance. Then came the pneumatic tire with its almost universal adoption, it being unanimously agreed that "riding on air" was much more comfortable than "riding on iron." In other words, the springing up and down of the air cushion would materially lessen the vibration, tend to eliminate crystallization, broken springs and loose nuts, and secure much more comfort for the passengers.

The Danger of Skidding

I know of no more senseless proceeding than to put a set of pneumatic tires on a car with the idea of securing ease of riding, and then to put a volume of compressed air in them to the extent that makes solid tires of them. Practically the same results follow as did with the old cars except that, by reason of better steels being used, the metal parts do not so readily crystallize and, by reason of better springs, the springs are not so often broken; but on account of the high rate of speed at which most motorists drive, there is a danger which was unknown in the early days, that of skidding, either in turning corners, or on roads where there is a slight roughness, such as an oiled macadam or asphalt road which has become "wavy." Very few accidents are the result of skidding on wet roads, as compared with those upon dry roads, as nearly all drivers proceed with extreme caution over wet, slippery pavements.

Now, anyone can easily prove to his own satisfaction, by trying it, that a car with tires inflated to 90 lb., which will skid over the dry roads as above indicated, will not skid over the same roads at the same speed, with the tires inflated to 60 lb. A machine which will not travel through sand at 90 lb. will do so at 60 lb.; likewise, a hill which it will not climb with 90 lb., it will climb with a 60-lb. pressure, Again, with a 90-lb. pressure, it is almost certain that early in the career of the tire the inner tube will be "pinched" either by being forced between the edges of the casing on the inside, or forced entirely under the casing.

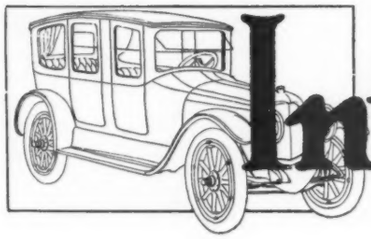
Rim Cutting Not Likely

The only apparently valid reason given for inflating tires until they resemble solid tires, is that the tires will not be rim-cut, and therefore, last longer. This is not correct. In good tires attached to rims which are now designed so that no sharp edges press against the wall of the tire, there is no rim cutting, unless the tire is run flat; and if a slightly larger mileage is obtained by pumping the tire hard, it is much more than offset in actual dollars by the cost of vulcanizing and replacing inner tubes, to say nothing of the annoyance, loss of time and energy expended in changing tires; add to this the elimination of the skidding danger, the elimination of loose nuts, bolts, and broken springs, as well as crystallization, and beyond all, for the average person, the luxurious ease of riding, and you have an array of reasons why a tire should not be over-inflated.

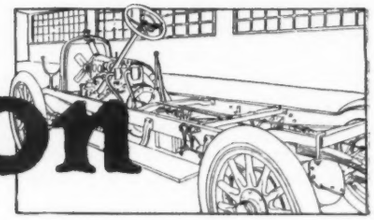
There may be some exceptions to this. There are certain tires which have been on the market but a comparatively short time, which are known generally as cord tires, on which the inflation pressure is marked at much lower figures than on the tires made in the standard fashion, and in the literature of some of these makes, it is stated that by reason of requiring less pressure, the car is easier riding, which is perfectly true.

Lower Pressure Practical

As a general rule, subject to some variations, and excepting as to cord tires, the tire should be pumped at least 20 lb. less than the maker advises. Some drivers get excellent satisfaction from rear tires inflated 20 lb. less, and front tires 30 lb. less than the maker advises. Personally, I have used a set of 4-in. tires (marked "inflate to 80 lb.") on a 3000-lb. car through mountains and over rough roads, with tires carrying not more than 30 lb. in front, and 50 lb. in the rear, and with exceptional ease of riding, the best of traction on hills and in sand and positively without any rim cutting or other injury to the tires except the ordinary abrasion of the tread.



Information



With this issue of THE AUTOMOBILE the Rostrum, as a department devoted to answering the questions of readers and to publishing communications of general interest, gives way to Information. In the new form a higher efficiency is aimed at by economy of space and a method of direct reply.

QUERY—Description of Claudel carbureter. 2—Total weight and chassis weight of 16-hp. and 20-hp. four-cylinder Sunbeam touring cars, 1915 model. 3—Meaning of term "cracking of the fuel" as found in article in THE AUTOMOBILE for Sept. 14. 4—Reason for small use of overhead camshaft of the Stutz and Mercedes type for stock car valve-in-head type engines. 5—Suitability of 2-in. clear opening valve for stock car when engine is designed to peak at 2500 r.p.m.

(1) Beemer, Neb. G. S.

—Fig. 1 is one of the latest Claudel carbureter designs. The section of the jet shows that both air and fuel are drawn through it, and in practice it is a kind of froth which leaves the nozzle. In the barrel throttle is a peculiarly shaped opening, and this acts as the choke, the area of air opening around the nozzle thus increasing as the throttle is opened. To set the "shut" position of the throttle there is a screw, and there is also a secondary fuel feed up a small pipe and past another screw which supplies a little fuel through a hole in the side of the throttle chamber. This by-pass supplies practically all the fuel for slow running, and some of the fuel all the time. Adjustment has to be made on both screws, that controlling the shut position of the throttle also affects the area of opening at all stages, it is really a choke adjustment throughout the full range, and the other screw controls the size of the by-pass orifice only.

The carbureter has to be chosen carefully to suit any particular size and sort of engine, and original adjustments are made by altering the proportions of the parts in the main nozzle, especially by varying the size and number of the little air holes in the outside sleeve of the nozzle. It is intended for gasoline.

2—The total weight of the 16-20-hp. four-cylinder Sunbeam car is between 3000 and 3400 lb. The manufacture of this car will be discontinued and the firm intends in the future to specialize on six cylinders; at least this is the latest advice from England.

3—When gasoline or kerosene is heated too strongly it breaks up into its constituent parts which consist of very light oils and very heavy ones, together with some actual solids. If cracking takes place in an intake manifold it will make tar-like deposits in the cylinders and valve chambers.

4—Because it is very expensive and it is far from easy to obtain quiet drive from an overhead camshaft. And furthermore, the overhead camshaft has no advantages for anything except racing or aviation engines.

5—This depends entirely on the size of the engine. A 2-in. clear opening is large enough for a cylinder of 4-in. bore.

? ? ?

Query—Solution for cleaning out radiator. 2—Cause of backfiring. 3—Advantage in substituting 100-amp. hr. for 80-amp. hr. storage battery.

(2) Mt. Vernon, N. Y. M. C.

—A solution of about 1 lb. of caustic soda in hot water is sufficient to fill the water system of an ordinary car. The water should be drained, the hot solution poured in, the engine run for 10 min. to thoroughly circulate the solution which should then be drained out and a continuous stream of water run in at the radiator cap and out at the drain for another 10 min. It is very important that all traces of solution should be removed, since otherwise it will damage the radiator.

2—The engine backfires, or turns in the wrong direction, when an attempt is being made to start it because the spark occurs when the piston is on the compression stroke and before it has reached the top dead center.

3—Yes. The 100-amp. hr. battery would have a longer life.

? ? ?

Query—Where to obtain equipment for wheels of Metz roadster, 1914 model, for running on railroad tracks.

(3) Glen Jean, West Va. C. P. C.

—You will have to have these wheels made specially. Probably you could make or have made rims which would clip on outside the present one. You need not be afraid to make these considerably larger than the old pneumatic tires, since, having no hills to climb, the car will bear a higher gear ratio.

? ? ?

Query—Diameter of exhaust pipe on 1915 model Fairfield Paige. Size and best position for hole for fitting cutout. Method of making hole without removing pipe. 2—Method of attachment of spotlight to windshield and wiring connections for spotlight.

(4) Newark, N. J. A. J. H.

—The diameter of the exhaust pipe on this model is 2¼ in.

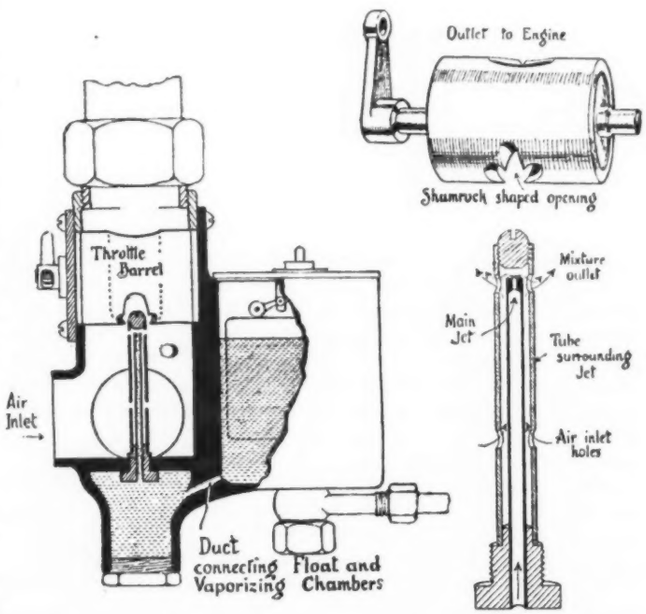


Fig. 1—Claudel carbureter of recent design, showing the action of the jet, which produces a sort of froth as the mixture leaves the nozzle

The best place to install a cutout is directly back of the bend in the pipe near the muffler. The size of the hole does not make much difference and we would suggest cutting this about 2 in. square. This can be accomplished by cutting across the pipe with a hack saw and cutting lengthwise with a cold-chisel. This is not a very easy job for an amateur unskilled in the use of a cold-chisel, but it is quite a cheap job at a repair shop.

Spotlights on the windshield are usually fitted with a plug which is attached to the dash light socket, although an extra switch can be installed on the dash and a wire run direct to the switch junction box. If the lamp should be single wire grounded type it will be necessary to run but one wire to the junction box, this to be attached to the top terminal. Should the lamp be a double wire type the two wires can be run to the top two terminals.

? ? ?

Query—Necessity for hydrogen flame in burning lead connections on batteries. 2—Possibility of using oxy-acetylene welding outfit for this work. 3—Best process. 4—Construction of hydrogen generator.

(5) Plaquemine, La. T. B.

? ? ?

—It is not essential, but it is much better to have a hydrogen flame.

2—A blow torch has to be used with great care since it is not very hot and there is a risk that too much of the lead will be heated up before it is melted at the small point where you desire to burn it. An oxy-acetylene welding outfit will give entirely too hot a flame.

3—A hydrogen generator is not a thing you can readily construct for yourself. Hydrogen is obtained in compressed form in steel bottles.

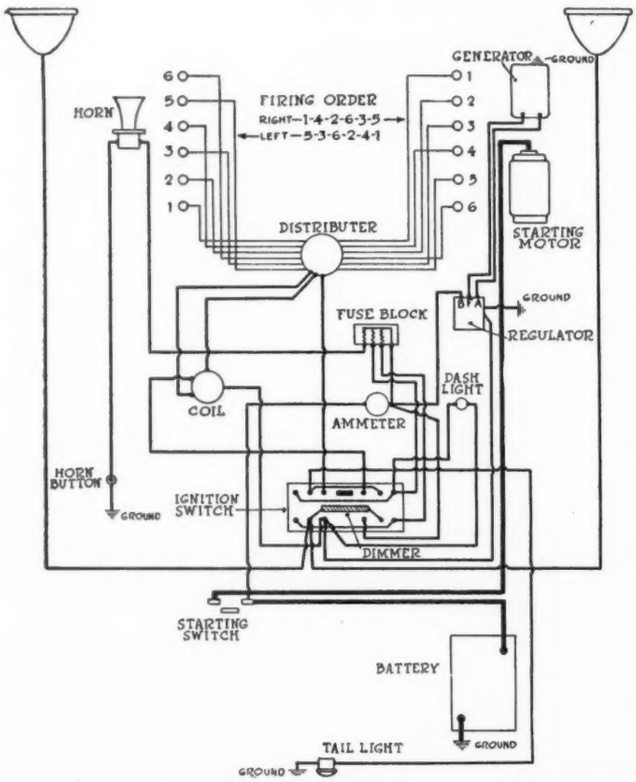


Fig. 3—Wiring diagram of starting, lighting and ignition system on the Hal car, showing connections to battery, switches, etc., and giving the firing order of the twelve cylinders

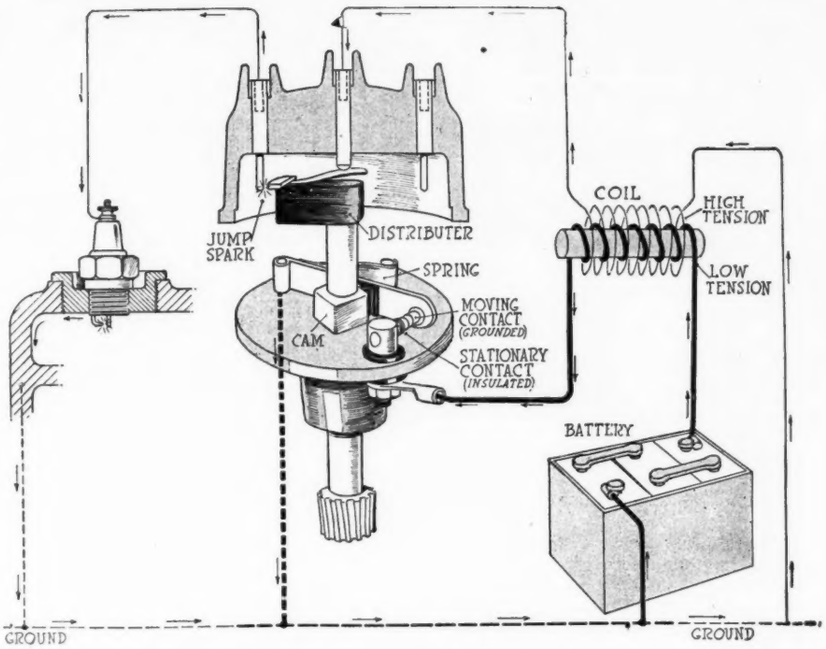


Fig. 2—Diagram illustrating the theory upon which battery ignition systems operate and showing the primary and secondary circuits

? ? ?

Query—Diagram showing theory of battery ignition systems in general, primary and secondary circuits.

(6) Brooklyn, N. Y. L. M. H.

—Diagram you request appears in Fig. 2.

? ? ?

Query—Cause of right-hand wheel of Buick model 10 locking after running about 10 ft. Brakes seem O. K., but housing gets warm. 2—Way of telling when axle is bent without taking it out of the housing. 3—Wiring diagram of starting, lighting and ignition on Hal.

(7) Bronx, N. Y. W. R. C.

—If you are certain that neither brake is binding, the axle should be taken to pieces and examined.

2—No certain way.

3—Diagram requested is illustrated in Fig. 3.

? ? ?

Query—Relative importance of the time used for combustion of the charge and of electrical lag within the ignition system in determining spark advance.

(8) Wellsboro, Pa. D. E. D.

—Spark advance is necessary almost entirely to make up for the time used in combustion. There is practically no electrical lag in modern ignition systems.

? ? ?

Query—Are steel cylinders of one piece construction with two inlet and two exhaust valves, similar to those used on the Mercedes aviation motor, made in this country?

(9) New York City. J. T.

—Several experimental engines have been built in this way, notably the Martin aviation engine in which a large number of stamped steel parts are welded together in a very ingenious way giving a cylinder with almost perfectly even thickness at every section.

Industrial Miscellany

Factory

Durston Gear Co., Syracuse, N. Y., will build a one-story, 50 by 108 ft. addition.

E. H. Sprague Mfg. Co., Omaha, Neb., has been formed to manufacture automobile accessories and is occupying the plant of the Standard Foundry Co.

Myers Rubber Co., has broken ground in Massillon, Ohio, upon which it will build a plant.

C. E. Hosbach Co., Baltimore, Md., maker of automobile tops and wagons, will build a one-story machine shop, 34 by 69 ft.

Continental Motor Truck Co., Superior, Wis., has completed work on its new factory and machine shop and is now erecting and equipping a power house.

A. Z. Metal Works, Thiensville, Wis., specializing in automobile and tractor radiators, lost its entire plant by fire. It is probable that a new factory will be erected.

Stungo-Radium Rubber Co., Pittsburgh, Pa., capitalized at $3,000,000 to manufacture automobile tires, has purchased the former Croxton Motor Co. Plant in Washington, Pa.

Piedmont Motor Co., Lynchburg, Va., is receiving bids on automobile manufacturing machinery and first installment for assembling.

National Welding Co., Newark, N. J., specializing in automobile repair work, has broken ground for a brick addition to its building. The new addition will be for the machine shop and welding department, and for handling smashed touring cars. The present building will be for commercial vehicles of every description.

Electric Tool & Appliance Co., organized recently at Milwaukee by Oscar Werwath, president of the Milwaukee School of Engineering, will erect a plant in the spring for the manufacture of patent box cutters and scientific laboratory apparatus. Temporary quarters will be obtained at once.

Aluminum Goods Mfg Co., Manitowoc, Wis., has purchased a group insurance policy in the Aetna Life covering all employes of the three big plants, at Manitowoc and Two Rivers, Wis., and New ark, N. J. The policy amounts to about $1,000,000 and the maximum sum on each employe is $1,000. It was purchased as a Christmas gift for employes.

General Bakelite Co., New York, has moved to 2 Rector Street. This company produces Bakelite, the heat-resisting, molded insulation.

Willys-Overland Co., Toledo, will establish a factory branch in Winnipeg, Man., to be a distributing point for the Province of Manitoba. This is the third branch to be opened by this company, the others being in Montreal and Regina.

Iowa Rubber Tire Co., has purchased the plant of the American Can Co., Davenport, Ill., for $70,000.

Reliable Auto Heater Co., Cleveland, has leased a plant formerly occupied by the Ashtabula Mfg. Co., on east side of city. This plant will be known as the Vesuvian Auto Heater Works. S. T. Campbell is in charge at this plant.

Stegeman Motor Car Co., Milwaukee, a manufacturer of trucks, will build a factory addition, 79 by 190 feet, adjoining the present plant at Woodworth and Linus Streets. The building will be of fireproof construction, and cost about $50,000 complete. It will be devoted principally for assembling purposes, and the space thus released from the present shops will be equipped with machinery and tools to provide the new shop with a largely increased output of parts.

The Automobile Calendar

ASSOCIATIONS

Jan. 6-13—New York, Mid-Winter Meeting of Society of Automobile Engineers, Engineering Society Bldg.
Jan. 9—New York City, National Automobile Chamber of Commerce, Annual Banquet at Waldorf-Astoria.
Jan. 9-11—New York City, Society of Automobile Engineers' Mid-Winter meeting, Thursday, Jan. 11, S. A. E. day. Annual Banquet, Hotel Biltmore, Special performance Ziegfeld's Midnight Follies.
Jan. 10—New York City, Motor and Accessory Manufacturers' Banquet, Waldorf-Astoria.
Jan. 24-26—Chicago, Second Annual Meeting National Assn. of Automobile Accessory Jobbers. Congress Hotel.

CONTESTS
1917

April—Los Angeles to Salt Lake City Road Race.
May 19—New York Metropolitan Race on Sheepshead Bay Speedway.
May 30—Indianapolis Speedway Race, Championship.
June 9—Chicago, Ill., Speedway Race, Championship.
June 23 — Cincinnati, Ohio, Speedway Race.
July 4—Omaha, Neb., Speedway Race, Championship.
July 14 — Des Moines, Iowa, Speedway Race, Championship.
July 4—Tacoma, Wash., Speedway Race, Championship.
Aug. 4—Kansas City Speedway Race.
Sept. 3—Cincinnati, Ohio, Speedway Race, Championship.
Sept. 15 — Providence, R. I., Speedway Race, Championship.
Sept. 29—New York, Speedway Race, Championship.
Oct. 6—Kansas City Speedway Race.
Oct. 13—Chicago Speedway Race.
Oct. 27—New York Speedway Race.

SHOWS

Dec. 9-16—Akron, Ohio, Show for Passenger Cars Only, Market Street Gardens, Akron Automobile Dealers' Show Assn.
Dec. 18-20—San Francisco, Cal., Automobile Salon De Luxe, Palace Hotel, I. R. Gates, Mgr.
Dec. 26-27—Olean, N. Y., Show, Armory Hall.
Dec. 30-Jan. 6—Cleveland Automobile Accessory Show, Dreamland Auditorium.
Dec. 30-Jan. 6—Cleveland, Ohio, Sixteenth Annual Show, Wigmore Coliseum, Cleveland Automobile Club.
Jan.—First Pan-American Aeronautic Exposition, New York City; Aero Club of America, American Society of Aeronautic Engineers, Pan-American Aeronautic Federations.
Jan. 2-10—New York, Automobile Salon, Hotel Astor, J. R. Eustis, Mgr.
Jan. 6-11—Milwaukee Auditorium, Milwaukee Automobile Dealers.
Jan. 6-13 — New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.
Jan. 12-20—Philadelphia, Show, Philadelphia Automobile Trade Assn.
Jan. 9-10 — Fort Dodge, Ia., State Convention, Iowa Retail Automobile Dealers' Assn.
Jan. 20-27—Detroit, Mich., 16th Annual Show, Detroit Automobile Dealers' Assn.
Jan. 22-27—Rochester, N. Y., Show, Exposition Park, Rochester Auto Trades Assn.
Jan. 22-27—Manchester, N. H., Academy.
Jan. 22-27—Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.
Jan. 23-27 — Baltimore, Md., Show, Fifth Regiment Armory.
Jan. 25-27—Asheville, N. C., Show, Asheville Automobile Trade Assn.
Jan. 27-Feb. 3—Columbus, Ohio, Show, Memorial Hall, Columbus Dealers' Assn.
Jan. 27-Feb. 3, 1917—Chicago, Ill., Show, Coliseum, National Automobile Chamber of Commerce.
Jan. 27-Feb. 5—York, Pa., Show, York Automobile Dealers' Assn.
Jan. 20-27—Montreal, Que., Automobile Trade Assn.
Jan. 28-Feb. 3—Wilmington, Del., Show, Hotel duPont.
Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.
Feb. 5-9—Boston, 8th National Good Roads Show, Mechanics' Bldg.
Feb. 5-10—Bangor, Me., Bangor Automobile Assn., Auditorium.
Feb. 10-17 — Hartford, Conn., Show, State Armory, First Infantry.
Feb. 10-18—San Francisco, Cal., Pacific Automobile Show, G. A. Wahlgreen, Mgr.
Feb. 12-17 — Louisville, Ky., Show, First Regiment Armory, Louisville Automobile Dealers' Assn.
Feb. 12-19—Indianapolis, Ind., Show, Steinhart Bldg., Indianapolis Automobile Trade Assn.
Feb. 17-24 — Newark, N. J., Show, First Regiment Armory.
Feb. 19-24—Grand Rapids, Mich., Show, Automobile Business Assn. of Grand Rapids.
Feb. 14-17—Peoria, Ill., Coliseum, Automobile and Accessory Dealers' Assn.
Feb. 18-25 — St. Louis, Mo., Show, Automobile Manufacturers' and Dealers' Assn.
Feb. 19—Pittsfield, Mass., Show, Armory. J. J. Callahan, Mgr.
Feb. 19-24 — Duluth, Minn., Show, Duluth Auto Dealers' Assn., Armory.
Feb. 19-24—Bridgeport, Conn., Show, Armory, Coast Artillery Corps.
Feb. 19-24—St. Louis, Overland Bldg., St. Louis Auto. Dealers' Assn.
Feb. 19-24—Syracuse, N. Y., Show, State Armory, Syracuse Dealers' Assn.
Feb. 24-March 3 — Brooklyn, Show, 23rd Regiment Armory.
Feb. 26-March 3—Omaha, Neb., Show; Auditorium, Omaha Automobile Show Assn.
Feb. 27-March 4—Atlanta, Ga., Show, Auditorium, Atlanta Auto Trades and Accessory Assn.
March 1, 2, 3—Urbana, Ill., Show, Automobile Trade Assn. of Champaign Co. Armory of the University of Ill.
March 3-10 — Boston, Mass., Show, Mechanics' Bldg., Boston Automobile Dealers' Assn.
March 6-10—Ft. Dodge, Iowa, Northern Iowa Show, New Terminal Warehouse, G. W. Tremain, Secretary.
March 14-17—Davenport, Iowa, Show, Coliseum Bldg., Tri-City Automobile Trade.
March 18-23—Cedar Rapids, Ia., Cedar Rapids Automobile Trades Assn.
April—Calumet, Mich., Show, Coliseum, Frank Ketchell, Mgr.